ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

One Year, United States, $3.00; Canada, $4.00; Foreign Countries, $6.00. Single Copy, 10 cents; back one month, each, 25 cents. Entered as second-class matter, November 7, 1908, at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

VOL. LXVIII, No. 3. CHICAGO, SATURDAY, JANUARY 15, 1916. ISSUED WEEKLY

Contents

Electricity in Paint Manufacturing 102

An Outline of the Advantages of Electric Motor Drive with Special Reference to the Manufacturing Process Involved and Horsepower Requirements of Various Machines—Data on a Typical Installation Are Given.

Electrical Construction in Hotel Morrison, Chicago 111

Wiring for Light and Power and Telephone and Signaling System Embodies Many Interesting Features.

Business Hints for the Electrical Dealer—By G. D. Crain, Jr. . . 117

Care Necessary in Estimating Repair Work—Economy Results in Providing Repair Men with Complete Equipment for a Specific Job—Big Opportunities for Sales to Office and Apartment Buildings.

Editorials:
- Efficiency in Selling 94
- The Safety of Electric Power 94
- Adjusting Schedules 94
- The Future of Aluminum 95
- Extension of Electric Heating 95
- Protection from Competition 96
- Broader Training for Engineers 96

Happenings in the Industry:
- Illuminating Engineering Society to Hold Mid-Winter Convention in New York 97
- Radio Station Installed at Tufts College 97
- Prof. Thomson Lectures on Optical Instruments 97
- Get-Together Luncheon Held at Boston 97
- Increased Business Shown by Barstow Utilities 98
- Municipal Ownership Bill for Massachusetts 98
- Burley, Idaho, School is Electrically Heated 98
- Facilities for High-Tension and Radio Tests at Massachusets Institute of Technology 99
- Power Plant Costs Discussed by Mechanical Engineers 99
- Electrical Exports for October 99
- Flood Lighting Effects Economy in Building Construction 100
- Classification of Farm Lighting Systems 100

Commercial Practice:
- Efficiency in Serving Customers 105
- Employees' Commissions on Appliance Sales Successful at Cambridge 106
- Dayton Campaign Increases Consumption from Porch Lighting 106
- Organization of Boston Company's Operating Bureau for Turning Prospects Into Customers 106
- W. R. Putnam 107
- Church Societies Sell 500 Electric Irons for Central Station 107
- Low Heating and Cooking Rate for Washington, D. C 107

Power Engineering:
- Irrigation Increases Land Value from $20 to $400 Per Acre 108
- Government Investigating Use of Electric Power in Fertilizer 109
- Important Electric Furnace Contract for New Jersey Company 109
- Electric Heating Economical for Shoe Factories 109
- Facilitating Customers Development by Carrying Transformer Losses 110
- Trial Motor Installation Gets the Business 110
- National Advertising for Electric Power 110
- Electric Fire Apparatus Asked for at Springfield, Mass 110

Electrical Construction:
- "Don'ts" for Line Patrolmen When Using Portable Phones 115
- Among the Contractors 115

Electrical Merchandising:
- House and Department Conferences Essential to Euccessful Merchandising.—By C. H. Minor 116
- A Suggestion for a Battery Display Window 116
- Silician Buys American Electric-Light Carbons 116
- Fixture Sale Predicated on Satisfactory Lighting Installation 118
- Lamp Sale in Chicago 118
- New Electrical Store for Gary, Ind 118

Correspondence and Discussion:
- Grounding of Secondaries.—By C. H. Hill 119
- Timeliness in Electric Vehicles Sales.—By P. D. Wagoner 119
- Need for Electrical Clearing House.—By Harry N. Gilbert 120

Questions and Answers 121
Public Service Commissions 122
New Appliances 123
Industry Activities 128
Current Electrical News 130
Record of Electrical Patents 133

Copyright, 1916, by Electrical Review Publishing Company, Inc.

ELECTRICAL REVIEW PUBLISHING COMPANY, INC.

608 South Dearborn Street, Chicago

President and Treasurer, Charles W. Price. **General Manager, A. A. Gray.**

Manager Western States, C. W. Forbrich, Chicago. **Manager Middle States, J. B. McCarthy, Detroit.**

Manager Eastern States, E. E. Wood, 13 Park Row, New York

Member of Society for Electrical Development, Inc. "Do It Electrically."

EDITORIALS

EFFICIENCY IN SELLING.

The day has passed when the world will make its beaten path to the door of the genius who has something which the world needs. It is necessary today for the man who wishes to have the world use his wares to seek his customers. Every successful business must have its selling organization, and the problem of organizing this branch of the business and co-ordinating the advertising and solicitation is one which deserves the close study of every manager. It is becoming well recognized that the most successful head of a department is one who devotes his entire energy to executive work and does not attempt to carry out the details. It is a good rule for such a man to never attempt to do anything that some one else can do better, or that some one else can do as well and more cheaply.

The executive discovers the capabilities of his men and develops them to the greatest productiveness. It is for him to put each man at the work which he can do best. It is for him to co-ordinate the efforts of the entire force and to see that direct sales efforts and advertising activities are properly fitted together. Any one can sell goods by making a sufficient expenditure for advertising and selling. The great problem is to sell the most goods or service with the least expenditure. This requires careful study and judicious use of advertising space. Modern business succeeds only through efficient advertising and a choice of advertising methods and advertising mediums must not only be intelligently made, but must be co-ordinated with the other policies of the selling organization. These principles apply to the electrical jobber or dealer as well as to every other line of business.

THE SAFETY OF ELECTRIC POWER.

One of the prominent characteristics of electric power which recommends it for application to a great variety of purposes is its comparative safety. Electrical accidents are comparatively rare and even in power stations and other places where considerable electrical apparatus is used, the number of accidents due to electrical causes is usually less than the number due to other causes. Moreover, most of the accidents of electrical origin can be directly traced to carelessness on the part of attendants and frequently to deliberate neglect of established safety rules. On the other hand, the presence of large numbers of belts in a shop or of gearing and other forms of power-transmission equipment is a frequent cause of accidents which can only be avoided by the installation of carefully devised guards and other protective and safety devices.

Another great advantage in having a supply of electric power on the premises is the possibility of furnishing adequate lighting, which can usually be done in large factories only by the use of electric illuminants. Adequate lighting not only means better output with respect to both quantity and quality, but also greater freedom from those accidents which result from inadequate illumination. It has been definitely shown that accidents from the latter cause are greater in those months of the year which include the smallest number of daylight working hours. The provision of proper artificial light would largely counterbalance this condition of affairs.

ADJUSTING SCHEDULES.

Many central-station companies have given very exacting study to the formulation of rate schedules, but in many other cases schedules have been written without thorough investigation of the requirements of the situation. In many instances due consideration has not been given to the need for simple, logical and justifiable schedules. Now that utility commissions are in existence in most of the states for reviewing schedules of electric rates and making changes in them when they cannot be justified, it is even more necessary than ever before to see that schedules are properly designed before they are put into effect or presented to the utility commission for approval. In order to pass inspection, it is necessary that schedules be intelligently worked out to fill their proper function, and moreover there must be no discrimination between different groups of customers which cannot be logically justified.

Among other things, a schedule of rates should be so devised as to be understandable to the customer, and to follow lines which will appeal to the public's sense of fairness, rather than to run counter to popular prejudices as to the merits of different classes of business. Quantity discounts are recognized in other lines of business and may well be used where other means for accomplishing the same end do not seem advisable. It is readily understood also that long-hour users are entitled to lower rates than short-hour users.

When properly constructed a rate schedule should also have the effect of encouraging consumption so as to help develop the business and increase the output. Above all things, it should be such as to provide the necessary revenue for carrying on the activities of the company. It has been amply demonstrated that a scientific rate schedule will help to develop the business and that it will often, even where reductions in the rate per kilowatt-hour have been made, effect a notable increase in net profits.

THE FUTURE OF ALUMINUM.

The period of the European war has seen very remarkable changes in the prices of a number of metals. This has been partly due to the use of certain metals in manufacturing munitions of war and partly to the interference with ordinary production and distribution on account of the war. This tendency was not so manifest in the early months of the war as it has been during the past calendar year. The two metals most widely used in the electrical industry are steel and copper. The price of steel one year ago averaged about $19 per ton; it is now quoted at $32 per ton. One year ago copper could be purchased for 14 cents per pound; since then the price has risen, with temporary fluctuations, to over 22 cents per pound. Other metals, such as tin, zinc and aluminum, have shown even greater increases.

The principal use of aluminum in the electrical industry is as a substitute for copper in transmission lines and busbars. For a few years past the prices of aluminum and copper have been such that there has been little choice from the standpoint of cost. The difference has mostly been in favor of aluminum, however, and we have seen a large number of long-distance transmission lines constructed of this metal.

The changes during the past year, however, have decidedly reversed this situation and present prices of aluminum not only make it prohibitory to use this metal in erecting lines, but it actually pays to take down existing lines of aluminum and replace them with copper. This has been done by a number of companies and a very substantial margin of profit has thereby been effected in certain cases. Such a condition is, of course, only temporary, and a return to normal conditions of production and distribution will undoubtedly turn the scale again the other way.

A year ago aluminum was quoted at 19 cents per pound; in the latter part of 1915 the price went as high as 60 cents and at present writing is 53 cents per pound. This extraordinary rise has of course been due to the fact that the demand has been in excess of the supply. Consumers in this country have been well taken care of by domestic manufacturers and most of the product has been disposed of at prices much less than those just quoted, on a basis of contracts made earlier in the year.

The production of aluminum will undoubtedly be much stimulated by present conditions, but even in the normal course of events it undoubtedly would have continued to increase. Aluminum is one of the most abundant metals in the earth's crust, and the supply may be said to be literally inexhaustible. The price has been on the decrease for many years, and the production has steadily increased. In 1914, before the war began, the world's production was at the rate of 50,000 tons per annum. The production in 1915 has been estimated at 75,000 tons and in 1916 it will no doubt be even greater. Copper, on the other hand, is fairly plentiful today, but it has been computed by good authorities that a period of about 20 years will be sufficient to exhaust the visible supply of this metal, which is so valuable from the industrial viewpoint. While it is, of course, possible that fresh deposits may be discovered, it is well to bear in mind that it will be necessary at some time in the future to greatly restrict its use and to substitute aluminum or some other metal for every application where this is feasible. We may expect a generation or two hence to see every electrical transmission line constructed of aluminum. The recent profit-taking in pulling down aluminum lines to substitute copper, will be followed at some not far distant date by another profit-taking in the process of pulling down the copper and again substituting aluminum.

Electrometallurgy combined with hydroelectric power have enabled the aluminum industry to grow from the infantile stage to the status of an established industry within a very short period, in spite of temporary derangements. Production will, in the main, increase sufficiently to meet the demands for this metal and in the future the price may be expected to show a general trend downward, as it has in the past. Its extended use in other industries makes its electrical application a minor consideration in the balance between supply and demand, but the conditions above pointed out will undoubtedly lead to its substitution as far as may be possible for copper in the electrical industry.

EXTENSION OF ELECTRIC HEATING.

In a number of places in our Western States where coal is scarce and water power abundant, electrical energy has been used for the heating of buildings, as well as in small electric appliances and for cooking. In the issue of May 9, 1914, a description was given of the installation in the high school at Rupert, Idaho. This town comes within the area of the Minidoka irrigation project, which utilizes a large amount of electric power for pumping during the irrigation season and has spare capacity during the winter. Consequently electric energy can be supplied at a price which makes the cost of such heating of buildings but slightly greater than if coal were used, and at the same time such advantages are obtained as ease of control, cleanliness, convenience and freedom from caring for refuse.

A high school during the last year has been erected at Burley which is much larger than the one at Rupert and accommodates 2,000 pupils. The heating plant in this building utilizes electric energy to heat the ventilating air and to distribute it to the individual rooms. This heating plant has a capacity of 700 kilowatts and is the largest installation of the kind which has come to our attention. It goes without saying that electric cooking is used both in the lunch room and in the domestic science classes in this school.

The activity in the West in installing heating and cooking installations is paralleled by the recent activity

among manufacturers in putting new equipment upon the market. Not only have electrical manufacturers greatly increased the variety of their product, but former manufacturers of gas and coal ranges are appreciating the importance of this field and are preparing to participate in the market for electrical devices. There is little doubt but what they will find an avenue for the disposition of their product, providing the latter is well suited for its purpose and that the prices are right. The field for the absorption of this class of merchandise is rapidly expanding and the demand in the near future is likely to be enormous.

BROADER TRAINING FOR ENGINEERS.

An appeal for a broader education for engineering graduates than that generally furnished by the technical schools of the country was made by Prof. Walter I. Slichter, head of the Electrical Department of the Columbia Graduate Engineering School, in a speech made recently at Pittsfield, Mass. He referred to the changes recently made at Columbia in placing the engineering schools on a graduate basis, which he thinks is a forward step in the aim to counteract the narrowing influence of the technical subjects by cultivating breadth of thought, aggressiveness, originality and a good command of English.

According to Professor Slichter, there are 117 technical schools giving courses in electrical engineering in the United States. Of these, 25 give a first-class course of professional work, 71 give electrical engineering along with the general education, and 21 give only elementary instruction in electrical engineering. These schools have granted degrees to about 22,500 men since their establishment, and for the last nine years the number of graduates has been nearly constant at 1,500 per year. During this time the amount of business done by electrical engineering concerns has increased 100 per cent and the figure of the gross earnings for the various branches of electrical engineering for the year 1914 was $2,265,000,000.

The failure of the number of men entering the profession of electrical engineering to keep pace with the increase in business is ascribed to the fact that the best positions in the business are filled by men who have not taken the technical course, thereby depriving the technical graduate of the incentive which he should have. The failure of the graduate of engineering courses to attain the position of prominence in business, politics and society that is filled by the lawyer and the business man is probably due to a lack of breadth in engineering training.

The general character of engineering training with its laborious, routine, technical work, is inclined to make a man narrow and to cause him to devote so much attention to the technical details of his work that he loses touch and even interest in general affairs. It should be the object of a course in engineering to counteract this narrowing influence of the technical subjects by cultivating breadth of thought, aggressiveness, originality and a good command of the English language, for without the latter a fine intellectual equipment is liable to be wasted for lack of appreciation.

These points have been emphasized before, but unfortunately only a few of our technical schools have taken steps to improve the old conditions in the preparation which they give to their students. We are glad to see that Columbia University is giving close attention to the matter. Undoubtedly the lengthening of the period of college training will make it more possible to broaden the course of instruction, and will be advantageous at least to the smaller number of students who find it possible to devote additional years to study in a graduate course. To a large number of students this will appear, even if it be not really, impossible, and a broadening of the ordinary four or five-year engineering courses must still be hoped for.

PROTECTION FROM COMPETITION.

A curious case has come up before the Public Utilities Commission of Missouri involving protection from competition. The public-utility laws of most of our states require a new utility corporation to secure a certificate of convenience and necessity before beginning operation. Most of the state commissions have interpreted their authority in this matter with the idea of protecting an existing utility which is giving satisfactory service from the competition of a new company which would merely duplicate existing facilities, since it is recognized that such duplication involves an unnecesasry economic expense. History has shown that while such competition may result in temporarily reducing the rates for service, it eventually saddles a greater cost upon the consumer and in many cases, such as telephone service, involves less convenience to the customer during operation.

In the Missouri case referred to, a city was furnished acetylene for lighting and the utility furnishing this service objected to the introduction of electric service, which would come in competition with it. It would, indeed, be a miscarriage of the intent of the utility law if the people of Browning were deprived for all future time of the benefit of electric service because they happened to have facilities for another type of lighting first. The Commission has taken the only sane view of the situation and explained that, while its policy is to protect the utility from duplication of service, the furnishing of electric energy cannot, in this case, be regarded as a duplication. In a certain sense electricity and any form of gas are competitors in furnishing lighting service, but electric energy can be used for other purposes, such as power, heating and charging storage batteries, and a supply of gas will not make up for what is lost without such service.

Happenings in the Industry

Illuminating Engineers to Hold Convention in New York—Tufts College Radio Station Has Wide Range—Electric Heating in Idaho High School—New Wireless Station for Massachusetts Institute—Exports for October — Flood Lighting for Construction Work — Miscellaneous Notes

Illuminating Engineering Society to Hold Mid-Winter Convention in New York.

The midwinter convention of the Illuminating Engineering Society, which will be held in New York City on February 10 and 11, at the Engineering Societies' Building, will be the most important convention yet held by the Society and will be marked by several events of more than usual interest. One of these will be the conferring of an honorary membership in the Society upon Thomas A. Edison. This will be the first time that Mr. Edison has been made an honorary member of an engineering body. This convention will also celebrate the tenth anniversary of the Illuminating Engineering Society.

The presentation of the honorary membership to Mr. Edison will be made at a banquet at the Hotel Biltmore, on Thursday evening, February 10, which is the eve of Mr. Edison's birthday. Dr. Charles P. Steinmetz will act as toastmaster at this banquet and among the speakers will be Governor Whitman and Mayor Mitchel. The presentation will be made by John W. Lieb, vice-president of the New York Edison Company.

The convention will be formally opened at 10 o'clock on Friday morning with an address of welcome by Mayor Mitchel. Arthur Williams, general commercial manager of the New York Edison Company, will preside. It is expected that among other speakers at the morning session will be L. B. Marks, Hugo Munsterburg, Cass Gilbert, Park Lewis, and George B. Cortelyou.

Among the papers which will be presented at the convention are: "Lighting and the Panama-Pacific Exposition," by W. D'Arcy Ryan; "Theater Lighting," by Bassett Jones, Jr.; "Colored Glass in Illuminating Engineering," by H. P. Gage; "Illuminating Engineering Photographs," by B. H. Norris; "Lighting of Public Service Buildings in New York," by C. L. Law and Thomas Scofield; "Gas Lighting of a Prominent Building in Philadelphia," by J. D. Lee; "Candlepower Measurements of Series Gas-Filled Incandescent Lamps," by Ralph C. Robertson; "An Interlaboratory Photometric Comparison of Glass Screens and of Tungsten Lamps in Modern Color Differences," by G. W. Middlekauff and J. F. Skogland; "An Average Eye for Heterochromatic Photometry and a Comparison of a Flicker and an Equality-of-Brightness Photometer," by F. K. Richtmyer and E. C. Crittenden; "An Integrating Sphere," by E. B. Rosa and A. H. Taylor.

The Convention Committee consists of an exceptional number of prominent engineers, public officials and others from New York and vicinity. Arthur Williams is chairman and Clarence L. Law is secretary of the committee.

Powerful Radio Station Installed at Tufts College.

One of the most completely equipped wireless plants in the country is at Tufts College, Medford, Mass., recently completed by the American Radio & Research Company, which operates the plant though the latter is available for use by the Tufts Wireless Club. The tower is about 300 feet in height and is held in position by four sets of guys. The antenna is of the umbrella type and consists of 10 wires, each about 450 feet long, radiating from the top of the tower. At a point about 150 feet above the ground these wires are broken by insulators, and the upper ends of the wires are connected by a stranded conductor which in turn is connected to the lead-in. Both tower and guy ropes are insulated from the earth so that when these are used as antennae the capacity is very large.

The ground connection is through a network of copper wires buried about 18 inches in the soil, which is moist and furnishes exceptionally good ground connection.

The building was designed especially for radio work. It consists of two office rooms, a room for the Wireless Club, a large operating room, and a well equipped machine shop in the basement. Power for the latter is obtained from the Boston Edison Company's lines, and it is planned to install a rotary converter to convert alternating into direct current for transmitting both telephonic and telegraphic radio messages.

The receiving apparatus consists of an oscillating audion, loosed-coupled receiving transformer, four variable condensers, a secondary reactance and a pair of amplifying telephone receivers with mica diaphragms. Stations in Germany are readily heard at this station.

Professor Thomson Lectures on Optical Instruments.

On January 5 Prof. Elihu Thomson gave an instructive talk before the Lynn Section of the American Institute of Electrical Engineers. Lens-making for microscopes and telescopes was treated at length, and in place of lantern slides the instruments and lenses themselves were exhibited. The supply of optical glass has been greatly curtailed by the war, as France and Germany are the chief centers of manufacture.

The lecturer showed a 10-inch objective which he ground for his telescope, and uses at his observatory at Swampscott. A recent visit to the workship of Prof. Richie of Pasadena, Cal., was described, mention being made of the work now being conducted on a 100-inch telescope there. The grinding and testing processes were described in detail. In the course of the lecture camera lenses were also treated in a comprehensive way. After the lecture the many exhibits were examined.

Get-Together Luncheon Held at Boston.

Nearly 200 men attended the first of a series of noonday get-together luncheons of New England electrical interests at the American House, Boston, January 6. These gatherings, which were so popular last winter, consist of a 50-cent luncheon, followed by a discussion of matters of vital concern to the industry. They are held under auspices of the New England Section, N. E. L. A.

In the enforced absence of President W. S. Wyman and Vice-President R. W. Rollins, Former President L. D. Gibbs presided. For mutual acquaintance's sake, each man present was called upon to announce his name, business connection and address. Slips of paper were furnished, on which questions were written, to be answered through the Section Secretary's office from information obtained from central-station managers or experts on the particular subject.

Mr. Gibbs announced that the Fall Convention will probably be held in Western Massachusetts. The 15 section

committees appointed to work in conjunction with kindred committees of the national organization are meeting bimonthly, and each will formulate a report to be presented, in lieu of papers, at the annual Section convention, when parallel sessions, or particular topics, will be held, rather than general sessions in which a large share of the members might find little personal interest.

The next luncheon, which will occur on February 10, will be given to a discussion of the results of Electrical Prosperity Week.

Increased Business Shown by Barstow Utilities.

Among the utility properties reporting good earnings for 1915 is the General Gas & Electric Company, whose properties are operated by W. S. Barstow & Company, New York, N. Y. This company, formed in 1912, controls electric, gas and railway properties at Rutland, Vt., Binghamton, N. Y., Sayre, Pa., Easton, Pa., Sandusky and Port Clinton, O., and railway lines entering Toledo, O. Each of these properties showed an increase in gross earnings over 1914, the aggregate being $227,532.17 or 10.3 per cent. December earnings increased $43,016.44 on the combined properties.

W. S. Barstow & Company, operators of these properties, announce that new power contracts closed last week alone by several of the properties will increase the gross in 1916 by about $75,000. Of the earnings of 1915, 66.2 per cent were from electric light and power receipts; 19.9 per cent from gas; and 13.9 per cent from railway properties. The franchises of the subsidiary companies are perpetual, except in a few minor and unimportant instances.

Municipal Ownership Bill for Massachusetts.

A bill which has been introduced in the 1916 Massachusetts Legislature seeks to make possible the acquisition by the state, city or town, of any public utility on vote of the citizens upon a referendum petitioned for by five per cent of the registered voters. The price at which the utility would be taken would be the actual value of the tangible property without regard to franchise or income value.

A resolve to be considered by the session provides for a constitutional amendment which would enable the General Court to regulate or prohibit advertising signs on either public or private property. This object was aimed at in a measure which was referred last year to a special commission, of which the Gas and Electric Light Commissioners were members, but no action resulted.

Insull Talks to Technology Alumni.

At a banquet of the alumni of the Massachusetts Institute of Technology, held in Boston on the evening of January 8, Samuel Insull, president of the Commonwealth Edison of Chicago, spoke upon the economic advantages of the electrification of steam roads. Mr. Insull advocated gradual or piecemeal electrification rather than complete immediate electrification.

He referred to the great diversity of demand in Chicago and stated that the capacity of his company's plant is 337,000 kilowatts, and of other producers 264,000 kilowatts. If the railroads were electrified they would require 125,000 kilowatts, a total of 728,000 kilowatts. The diversity of the demand is such that all of these requirements could be supplied with a capacity of 377,000 kilowatts. This would result in a saving in investment of $30,000,000 and a saving in coal consumption of 5,900,000 tons.

Telephone in South America.—Argentina leads South America in the total number of telephones, having 75,000 two years ago, but Uruguay has more per capita.

Burley School Is Electrically Heated.

In Burley, Idaho, a new concrete school building which accommodates 2,000 pupils and cost $80,000, is being heated electrically. The heating plant is described by Barry Dibble in *Reclamation Record*, the town being within the area of the Minidoka irrigation project and less than eight years old.

The heating plant in this new school is elaborate and thoroughly modern. Fresh air is drawn from the roof of the building at the rate of 50,000 cubic feet per minute and taken through a shaft to the basement. It then passes through electric tempering coils which heat it to 50 degrees Fahrenheit. Afterwards it is washed and humidified and then reaches the large motor-driven blower. This forces the air into two plenum or pressure chambers. One contains reheating coils which raise the air temperature to about 100 degrees Fahrenheit; the other merely holds the cool air from the washer. Separate ducts are provided to carry the air to each room in the building, and each duct is tapped into both hot-air and cold-air chambers. The amount of air the duct gets from each is controlled by dampers, and these in turn are regulated by a thermostat in the room supplied. In this way every room is maintained at a temperature of 69 degrees and supplied with a constant and ample quantity of pure air.

The heating plant has a capacity of 700 kilowatts. The amount of electricity actually used is automatically regulated to suit the requirement of the weather. Already the system has proved itself an unqualified success.

Hot water for the entire building will be heated electrically. The domestic science department has a complete outfit of electric hot plates for the use of the individual students, as well as a large electric range for baking and for cooking large portions. Children are brought to the Burley schools by wagon from distances as great as six miles out in the country. Practical use of the domestic science department is made in the preparation of hot noon lunches for these youngsters. The food is sold at low prices. Meal tickets can be obtained either for cash or in exchange for such supplies as milk, eggs, butter, etc., which the children can bring from the farm. In this way the cafeteria is easily made self-supporting and the domestic service classes given the very best of experience.

The building is, of course, well lighted throughout and is much used by Burley as a social center.

Another addition to Burley during 1915 is a modern hotel of 50 rooms. This building, of three stories and basement, is electrically heated. In this case small heaters are used in each room, taking the place of steam radiators. The building, including nine stores as well as the hotel, requires a maximum of 250 kilowatts.

Electricity for heating is sold at from $1 to $1.25 per month per kilowatt of capacity. One kilowatt in the southern Idaho climate will heat from 500 to 4,000 or more cubic feet, depending upon the size and construction of the building, the exposure of the room and the temperature to be maintained. An ordinary five-room house can be kept comfortable during the winter at a cost of from $10 to $15 per month. A good grade of western soft coal in these communities costs $8 per ton. Electric heat for domestic use therefore costs but little more than coal and its cleanliness and convenience puts it in a class by itself.

New Power Plan Protects Niagara Falls.

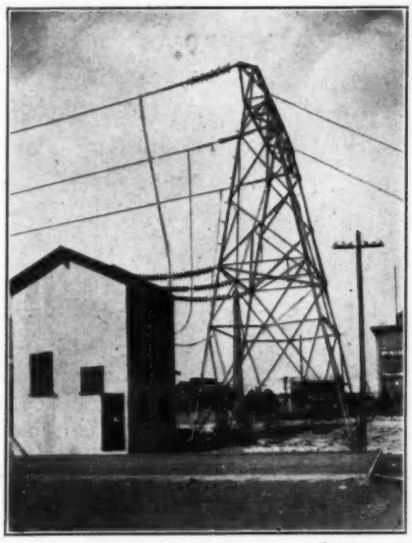
Plans for tripling the power now being derived from Niagara Falls without diverting any water from the crest were placed before the New York Legislative Committee on Water Power by the Thomson-Porter Cataract Company. It is proposed to construct a dam below the rapids, raising the water 90 feet, at an estimated cost of $100,000.

Facilities for High-Tension and Radio Tests at Massachusetts Institute of Technology.

A feature of the equipment of the Electrical Engineering Department in the new buildings of the Massachusetts Institute of Technology at Cambridge, Mass., is a transmission span of three power conductors suspended between two steel towers about 500 feet apart. This is a replica, in mechanical details, of a standard span in the Big Creek line which transmits energy at 150,000 volts from a hydraulic plant in the Sierra National Forest to Los Angeles, 240 miles, and was the gift of Stone & Webster, Boston.

A 15-kilowatt, 100,000-volt transformer, located in a transformer house at the base of one of the towers, enables tests to be made with high voltages. Energy is obtained from the Cambridge Electric Light Company's 1,000-volt line.

Besides being serviceable for high-tension tests, the span makes an excellent antenna for radiotelegraph, and research along these lines is carried on in the transformer



New Wireless Station for Massachusetts Institute.

house when the span is not in use for high-tension tests.

In the electrical laboratory of technology is an artificial power transmission line and an Alexanderson high-frequency generator. The line consists of 27 specially wound inductive units, each occupying a separate shelf or compartment. Each unit corresponds to 30 miles of overhead copper conductor of 250 square millimeter cross section. When all the coils are connected in series they represent one of the three conductors of a transmission line 810 miles long.

Many valuable researches in the field of electrical transmission have been made on this line under the guidance of A. E. Kennelly, professor of electrical engineering.

Governor Urges Reduction in Regulation Costs.

The reduction of the Public Service Commission organization was recommended by Governor Samuel W. McCall of Massachusetts in his inaugural address January 6. The governor asserted that the increase in membership of the Railroad Commission, which was reorganized in 1913 and became the Public Service Board, with salaries aggregating, for its five members, nearly thrice those paid to the Railroad Commission, has not been justified by the increased jurisdiction given the new commission, which now supervises telephone, telegraph, railroad and street railway companies.

Suspension of British Patent-Working Requirements.

Information has been received that the operation of Section 27 of the British Patents and Designs Act of 1907 has been suspended during the continuance of the war and for six months thereafter by an act of Parliament dated November 23, 1915. The section referred to allows the revocation of any patent not worked in the United Kingdom within four years after date of granting, and the practical effect of its suspension is to extend the period within which patents must be put into actual operation in Great Britain.

Power-Plant Costs Discussed by Mechanical Engineers.

In the industrial world of today, power is manufactured, sold and bought just like any other marketed commodity. The cost of production depends on numerous factors—cost of fuel, cost of generators, labor cost, amount produced—and this cost is the chief criterion on which the market price depends. Of interest to the power consumer is (1) what his power costs him, (2) what it should cost, (3) where and why the loss has occurred.

At a meeting of the American Society of Mechanical Engineers, in the Engineering Societies Building, on Tuesday, January 11, Walter N. Polakov, superintendent of power of the New York, New Haven & Hartford Railroad discussed the question of standardization and predetermination of the cost of power. He demonstrated a simple method by which the owner of a power plant of any kind can, without the necessity of study of technical details, determine just how close the cost of his own plant is to the possible minimum cost of such a plant—in other words, how much more he is paying for power than he should pay.

Mr. Polakov has spent several years in cost standardization work. At one time he was expert consulting engineer to the Board of Estimate and Apportionment of the City of New York. He has been in charge of reorganization work and introduction of scientific management in several large industrial plants in this country.

Electrical Exports for October.

The official monthly report issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C., covering the foreign commerce of the United States for October, shows that the total value of the electrical exports was somewhat lower than that for last September, but exceeded that for October of 1914 by over 40 per cent. For last October the number of articles shipped in the four classes for which quantities are reported, were as follows: Electric fans, 2,451; arc lamps, 68; carbon-filament lamps, 62,397; metal-filament lamps, 812,368.

The following table gives the detailed figures for October and for the corresponding month of a year ago:

Articles.	October, 1915	October, 1914
Batteries	$ 82,554	$ 69,061
Dynamos or generators	137,445	131,286
Fans	34,042	6,684
Insulated wire and cables	201,856	144,906
Interior wiring supplies, etc. (including fixtures)	63,397	47,551
Lamps—		
Arc	1,219	9,846
Carbon-filament	8,516	4,625
Metal-filament	115,105	42,007
Meters and other measuring instruments	56,272	34,418
Motors	290,623	229,605
Telegraph instruments (including wireless apparatus)	30,171	9,454
Telephones	72,493	64,544
Transformers	31,540	40,655
All others	1,020,361	660,150
Total	$2,145,594	$1,494,792

The total value of all the electrical exports for the first ten months of 1915 was $19,386,325, compared with $16,697,829 for the corresponding period of 1914.

Pittsburgh Section to Discuss Reflection Laws.

The regular monthly meeting of the Pittsburgh Section of the Illuminating Engineering Society will be held Friday evening, January 21, in the Engineers' Society of Western Pennsylvania rooms, Oliver Building, Pittsburgh.

At this meeting T. W. Rolph, of Cleveland, will present a paper on "The Laws of Reflection and Transmission of Light."

This paper will give a statement of those laws and the foundations on which they rest, illustrating same with examples of the various laws. The proper application and limitations of these laws are also to be given and explained.

The Pittsburgh Section is very energetic, and much interest is being taken in the meeting.

New England Section, N. E. L. A., Outlines Its Activities.

In a letter to every member of the Section, the secretary, Miss O. A. Bursiel, describes the various functions of the organization and urges the fuller use of membership advantages. These include Section convention, monthly luncheons, committee work and the use of publications and the information bureau maintained at headquarters, 149 Tremont Street, Boston.

There will be 15 standing committees in the Section this year. These are: Relations with Kindred Organizations, Accident Prevention, Accounting, Public Policy, Commercial Section, Transportation, Entertainment, Publicity and Advertising, Question Box, Rate Research, Educational, Manufacturers' Section, Heating Research, Membership and Electric Vehicles.

Coming Civil Service Examinations.

Among the civil service examinations to be held in the near future by the United States Civil Service Commission, there have been announced competitive examinations to be held on March 15 for the following positions: aid at the Bureau of Standards; steam engineer, second class, for departmental service; telegraph operator for departmental service. Examinations for the following positions will be held on April 12: electrician for departmental service; steam engineer, first class, for departmental service; laboratory assistant, Bureau of Standards.

On other various dates between March 13 and June 5, there will be held examinations for telephone operators in departmental service.

Particulars regarding the qualifications of the above-named positions and details regarding the examinations therefor can be obtained from the United States Service Commission, Washington, D. C., or from the secretary of the local boards of examiners in the principal cities of the country.

Street Railway Insures Its Employees.

An innovation in street-railway practice in New England was announced New Year's day by the Union Street Railway Company, New Bedford, Mass., when life insurance, running to each of the company's 500 employees, was begun at the expense of the company, which took out a blanket policy for about $500,000 with an eastern company. Under the terms of this policy, employees with more than a year's service to their credit will receive, on death, if occurring during the year:

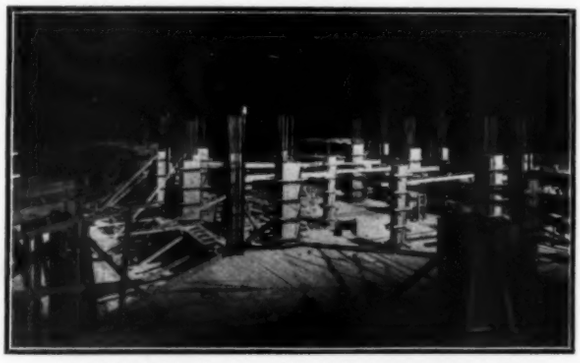
For employees who have been with the company between 1 and 2 years, $250; 2 and 3 years, $350; 3 and 4 years, $450; 4 and 5 years, $550; 5 and 6 years, $750; over 6 years, $1,000. This insurance is in addition to the accident insurance in force.

Flood Lighting Effects Marked Economy in Building Construction.

The decorative and advertising value of flood lighting is rapidly being appreciated as is evidenced by the increasing number of notable installations. Buildings which heretofore refrained from outline lighting or electric signs have become convinced of the effectiveness and dignity of flood lighting, which also has the advantage of low first cost and operation.

Aside from this phase, other uses have been developed which add greatly to the popularity of projector lighting. When the gruesome task of recovering bodies from the ill-fated steamer *Eastland* had to be carried on at night, flood lighting projectors were placed on all buildings fronting the river in the vicinity of the ship and the work carried on as efficiently as by day. In numerous construction jobs, where time was the all-important item, flood lighting has been used with gratifying results.

The accompanying illustration shows an installation of two "Sunbeam" 1,000-watt flood-lighting projectors lighting the construction work of the Edgewater Beach Hotel in Chicago. The two units, each equipped with a 1,000-watt nitrogen filled lamp are installed on a concrete hoist, 175 feet above the working floor and provide ample light for carrying on the work as efficiently and with the same dispatch as during the day.



Flood Lighting Used During Building Construction.

The installation replaced an equipment of several arc lamps which were previously installed about the job. The construction superintendent in referring to the new lamps stated that the efficiency of the men had been increased 25 per cent and the cost of lighting had been decreased 80 per cent over the previous installation.

Two additional units of the same type will be installed by the American Lighting Company for other sections of the work.

Petroleum Production Large.

Preliminary estimates of the total yield of petroleum for 1915 indicate a slight increase over the record-breaking yield in 1914. This condition does not agree with the currently reported reason for the exceptionally high prices now prevailing for motor fuel.

As a result of the overload put on the transporting and refining phases of the petroleum industry, by the excess output of crude petroleum in 1914, the year 1915 may be characterized as a period of readjustment in which production activity was purposely retarded as far as practicable. The small increase therefore is more significant than the simple figures suggest.

According to John D. Northrop, of the United States Geological Survey, the marketed production of petroleum in the United States in 1915 approximated 267,400,000 barrels, and the total yield approximated 291,400,000 barrels.

CLASSIFICATION OF FARM LIGHTING SYSTEMS.

Increasing Number of Types Being Manufactured Makes Classification Essential.

By C. H. Roth.

At the present time there are probably 100 or more manufacturers and assemblers of farm-lighting plants in the United States, and the number is increasing as the need for such systems becomes more evident.

Most of the plants installed are naturally enough of the simplest type, depending entirely on manual control for their successful operation.

This brings up the thought that we may best start out by dividing these systems into classes and types. I would suggest for the classes the following:

(A) Plants that give light only when the generator and engine are running.

(B) Plants that give light only from the battery, the generator being used only for charging the battery.

(C) Plants that give light from the battery, or from the battery and generator combined.

(D) Plants that give light either from the battery or generator, or from both combined.

The following types are suggested:

Manual.—Plants that are entirely manually started, operated, regulated, and stopped.

Semi-Automatic.—Plants that are partially automatic in some one or more features but not entirely so.

All Automatic.—Plants that are entirely automatic in starting, regulating the voltage, charge to battery, automatically stopping when the charge is complete or no lights used.

Starting with Class "A," manually operated type, we recognize the old established isolated plant. The larger the size of such plants the less necessary is automatic control, because the loads average so well that the regulation is naturally not much interfered with. Class "A" manually operated plants cannot be very successful unless a very good regulating prime mover is used. Therefore, we find systems which are of the Class "A" semi-automatic type—as, the smaller the plant, the more a certain amount of automatic action seems necessary because of the lack of steady prime movers, small amount of and lack of experienced help. These will be of the type that require manual starting, but once started will automatically regulate the voltage by changing the magnetic strength of the generator fields, or by changing the generator speed by throttling the governor of the engine or by similar means, until the last light is turned off, when the plant will be manually shut down.

Further refinements and added electrical devices bring us to the Class "A," all-automatic systems. The action of at least one of these systems is as follows. Upon turning on a light an electrical connection is completed that relays current from a small automobile type of storage battery to an automobile starter, thereby starting the engine and generator. On the last light being turned off the engine and generator automatically stop. These plants find particular favor at season resorts and other places where the plant is in operation for a comparatively short period of the year, because the ordinary care of storing for the off season is all that is required. If a complete storage-battery plant were used, considerable expert care would be necessary in storing it for the off season, and if entirely forgotten the battery would probably be ruined. Furthermore, these plants can use the standard 115-volt lamps and other appliances, their voltage not being dictated by the necessity of keeping battery cost down.

Class "B" using current from the battery only for lights would be of the manual type, or of the semi-automatic type. In these plants the generator would usually be running only during the day when the engine was being used for other work also, and no lights were needed. An attendant would probably be near at hand, who could take care of the voltage regulation. If the load on the engine was such as to often cause the speed of the generator to fall below the critical charging speed, the circuit-breaker would open and would then have to be manually closed, which would be very inconvenient. If a small engine is used to drive the generator only, then the engine does not necessarily need to be very close regulating, as the storage-battery charge, being elastic, will usually take care of such variation in speed.

Certainly the semi-automatic type, with automatic circuit-breaker and automatic voltage regulation would be the better type and perhaps absolutely necessary if the engine and generator varied considerably in speed due to heavy and intermittent load on the engine, or the poor inherent regulation of the engine.

Class "B" all-automatic plants need not be considered as they would really come under the Class "C" classification. In many old Class "B" plants duplicate sets of battery are used so one can be charging while another is being discharged.

Class "C" manually operated plants that give light from the battery, or from the battery and generator combined, can be successfully operated from the ordinary farm engine, because the charge to the battery can accommodate itself to such variations as occur unless they are very violent, in which case an automatic circuit-breaker becomes necessary, thereby bringing such plants into the semi-automatic type.

The Class "C" semi-automatic type having voltage regulation, automatically takes care of the battery charge, giving a charge that is in proper relation to the condition of the battery, gradually tapering or reducing the charge until a balance is obtained at which little or no current will go to the battery, when naturally the engine and generator will be manually shut down. Ordinary farm engines are satisfactory for such a plant.

Class "C" all-automatic plants are made in several forms with varying characteristics. One of these furnishes current from the battery until approximately 10 per cent of the connected load is put on, when the engine and generator automatically start up and the additional load is taken by the generator. When the load gets below the 10 per cent or other point at which the underload circuit-breaker is set, the engine automatically stops.

Others operate on the principle that when the battery voltage gets low, relays operate and the engine and generator automatically start up, continue running until the battery is fully charged as indicated by the voltage when another relay trips and automatically stops the engine.

Recommendations.

Voltage.—Thirty-two volts has become a standard for small plants having lights in a small area; 115 volts is better if the distribution system covers a considerable distance from the plant and if motors other than the small household motors are to be used.

Speed of Generators.—If belt-driven, 2,300 revolutions per minute or less gives general satisfaction. If direct-connected to the engine the speed should be lower, perhaps 800 to 1,000 maximum, although experiments are continually being made to produce higher-speed engines that are not noisy and have a reasonable life.

Capacity of Plants.—It might be well for the manufacturers in conjunction with committees of the American Society of Automobile Engineers and the Electric Power Club to work together toward standardization of sizes.

In view of the improvements that are constantly being made in lamps to reduce their current consumption, it would also be well to get the manufacturers to rate their plants on the fundamental basis of watts output, specifying separately the number of lamps of a particular candlepower, or the total candlepower of the plant.

Electricity in Paint Manufacturing

An Outline of the Advantages of Electric-Motor Drive with Special Reference to the Manufacturing Process Involved and Horsepower Requirements of Various Machines—Data on a Typical Installation are Given

Industrial Power Series—Article No. 150.

In this industry the nature of the machines and processes are such that there are no severe fluctuations of load other than what might occur by starting and stopping a large number of machines at one time. As there are practically no variable-speed characteristics demanded of the motors, the squirrel-cage-type induction motor lends itself readily to this class of work unless there is a large lighting load on the feeders, when it may be advisable to use an internal-resistance motor. Of course, the direct-current motor is equally applicable but the simplicity of the induction motor naturally recommends it where no variable-speed characteristics are demanded. Both group and individual drive are used and if the groups are well subdivided the former probably will prove the most economical if first cost of installation is considered.

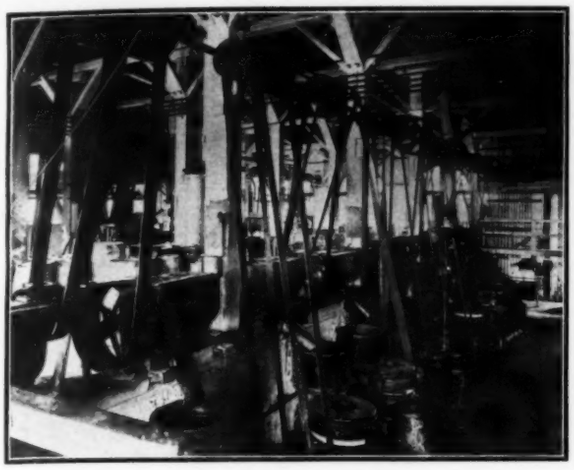
The principal machines used are paint grinders, which consist of revolving plates of steel or stone, screens and conveyors, water and oil lead-grinding mills, shakers and mixers, putty cleaners, packers, lead pulverizers, mixing of "rake" tanks, lead rolls, buckle machines, and large mineral paint grinders.

As to the advantages of electric drive and central-station service for paint manufactories, they may be classed in common with a large number of industries. The constant speed of electric drive adds to production and uniformity of the product and continuity of service is of especial value as a long interruption of power would be liable to deteriorate the product in course of manufacture. As a large amount of inflammable material enters into the manufacture of paint the use of electric drive materially reduces fire risks, and further it is possible to operate any department independently of another without keeping a central source of power in operation. There are, of course, a great many other advantages which, while not applying specifically to paint plants, must be given consideration when the question of electrification is being given consideration.

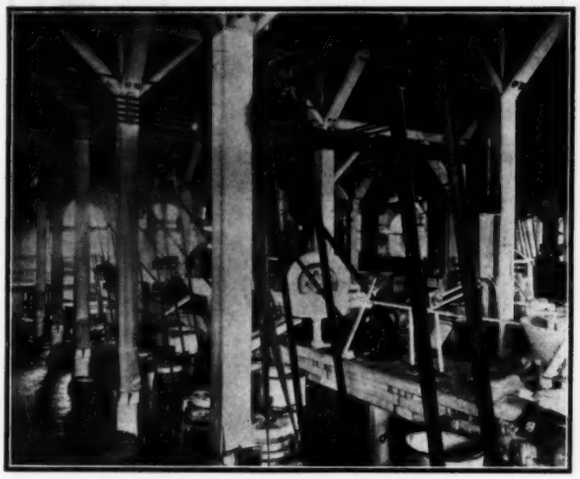
Process of Manufacture.

The following paragraphs outline the different processes involved in the manufacture of paint, and the principal ingredients and the power requirements of the various machines are given. It is beyond the province of such an article to enter into an extended discussion of the various pigments used and the possible combination of colors and tints. For

Battery of Motor-Driven Paint Mixers.



Motor-Driven Mills and Mixers.



Group of Paint Mills and Mixers.

all oil paints the most common vehicle is linseed oil, which is especially valuable on account of the property it possesses of oxidizing to a resinous body, which holds the paint in a firm waterproof varnish. By boiling this oil with litharge and sulphate of zinc it acquires the property of drying very rapidly, although the color is darkened by the operation. For some purposes other oils, as nut and poppy oils, are substituted for linseed oil. The latter being colorless, is preferred for very delicate colors, but it dries very slowly. In the preparation of oil-paints the pigment is mixed with a small quantity of linseed oil and ground in a mill to make the mixture homogeneous. About 8 per cent of oil is added to white lead and 12 or 13 per cent to zinc white. The pigment ground in oil is packed in convenient packages for the trade. When ready for use it is mixed with a further quantity of raw linseed oil which has been boiled, and colored pigments to any desired shade, which are also furnished ground in oil.

Pigments and oil alone form too thick a mixture for applying, so a third class of agents called thinners are employed in preparing the paint for use. Then are added either turpentine or benzine which mix freely with oil paint and thin it to any desired degree. Driers are also introduced, which consist of sugar of lead, sulphate of zinc, verdigris, binoxide of manganese, red lead, etc.

White lead is one of the most important ingredients of paint and consists of carbonate of lead and hydrate of lead in chemical union. It is a commercial name and is distinctive of a definite product which has been on the market for hundreds of years. During the year 1907 about 130,000 tons of white lead were manufactured in the United States. White lead is made from pure pig lead by a series of chemical and mechanical processes. Corroding gases from refuse tan bark while undergoing fermentation, change the pure lead into white lead. This process is carried on in special buildings where a layer of tan bark about 20 inches thick is first laid on the floor over which a layer of corroding pots is placed leaving space around the edges for packing with tan bark. A solution of weak acetic acid containing about 2.5 per cent of glacial acetic acid is prepared and about one-half pint is placed in each pot which is then filled with lead buckles. The first layer of pots is covered with boards and another layer of tan bark and this is repeated until about ten layers are in place. Suitable ventilation is provided to carry off the moisture from the stack of pots and tan bark.

It requires approximately an average of 115 days to complete the corroding process by which time the fermentation of the tan bark has practically ceased. The tiers of pots are then taken down and the pure lead has turned to white lead of porcelain-like material. The change is not complete, however, as some metallic lead remains which has to be removed and is accomplished by placing the contents of the pots into revolving screens where the white lead passes through the perforations and the metallic lead passes out as tailings and is re-melted for further use. The coarse white lead then undergoes further screening and rolling to prepare it for water grinding which is accomplished by means of high-speed mill stones. After the solution is passed through silk bolting cloth it is floated for some distance to allow coarse particles to settle and then pumped into tanks to settle.

The pulp, which is the thick mixture of white lead and

Motor-Driven Paint Mills.

Battery of Paint Grinders.

Motor Driving Battery of Paint Grinders.

water that settles in the bottom of the tank, is pumped into steam-heated, copper drying pans. After evaporation has ceased the dry white lead of the market is the result. This dry white lead is mixed with linseed oil and ground through burr mills to produce white lead paste or commercial white lead in oil. By means of special mixers the pulp is sometimes mixed directly with the linseed oil which combines mechanically with the lead excluding the water.

Zinc oxide, or zinc white, is another important ingredient of paint and is made from the ores of zinc. Fine anthracite and the crushed ore are thoroughly mixed and charged in special furnaces with perforated grate bars. An under-grate blast is provided for these furnaces which are built similar to a fire box. The products of combustion and the oxide fumes are discharged into the collecting system through flues aided by a suction fan. In the passage to the collecting system the gases are thoroughly cooled. Connected to the flue there is a system of horizontal pipes to which bags are attached and hang in a vertical position. These bags retain the oxide but allow the gases to escape; the bags are emptied from time to time, the material bolted through silk bolting cloth and packed in containers by machinery.

In the usual factory arrangement for the manufacture of paints the dry pigments are stored on an upper floor with arrangements for weighing and conveying them to the mixers located on the floor below. The liquid ingredients are generally stored in steel tanks outside of the building and pumped or forced by air pressure to the points where they are used. In the manufacture of prepared house paints, the pigments to be used are weighed out in the proper proportions and by means of rotary mixers the linseed oil and pigments are thoroughly mixed. The paste thus formed is treated in the paint grinders, producing a heavy paste which is allowed to drain into storage tanks ready for shipment.

Horsepower Requirements.

From a large number of tests it has been found that the average kilowatt-hour consumption per month per horsepower in paint manufactories is for indivdual drive, 46 kilowatt-hours and for group drive, 65 kilowatt-hours. The load-factors are 17.7 per cent for the former and 25 per cent for the latter. Load-factor here signifies the ratio of the actual energy used in kilowatt-hours to the maximum kilowatt-hours which would be used were the motors to be run at full load for 350 hours a month. From a typical small paint factory using electric drive the following data were obtained: Six small paint grinders group driven by a 15-horsepower, 2,300-volt, squirrel-cage type induction motor operating at 750 revolutions per minute. The accompanying table gives the horsepower requirements of the principal machines used.

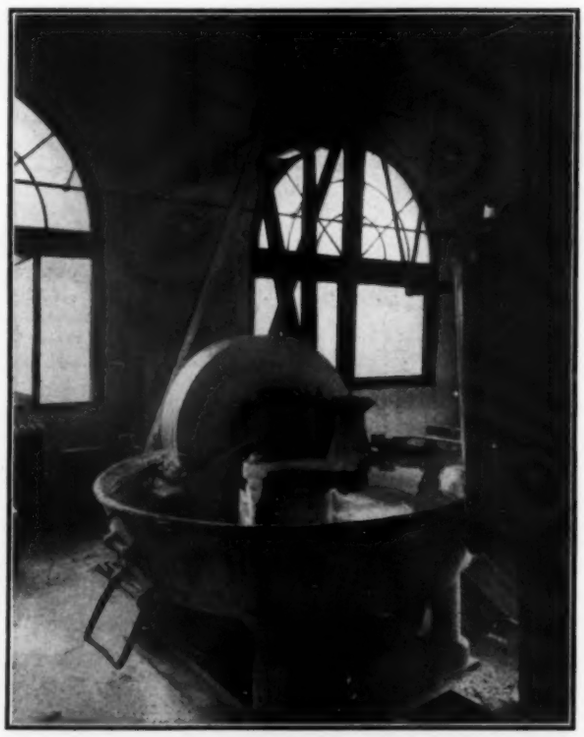
Machine.	Horsepower.
Paint grinder	3 to 15
Screen and conveyor	5
Water mill for lead grinding	35
Oil mill for lead grinding	20
Shaker and mixer	3
Putty cleaner	10
Packer	7.5
Lead pulverizer	2-10
Mixing tanks	3
Lead roll	10
Buckle machine	5
Large mineral paint grinder	20

A brief description of a typical plant devoted to the manufacture of paints and varnish will give a general idea of the motor requirements in this industry. The plant in question has an output of approximately 3,500 gallons of mixed paints and 12 tons of leads per week. There are 16 motors installed, having an aggregate horsepower rating of 262. The average consumption per month covering a period of 12 months is 11,769 kilowatt-hours.

The monthly consumption in kilowatt-hours for the past 12 months was as follows:

January, 13,728; February, 11,568; March, 12,432; April, 11,856; May, 7,536; June, 8,004; July, 11,924; August, 14,544; September, 12,768; October, 9,320; November, 14,928; December, 12,624. The average load-factor of the plant is 10.2 per cent.

The motor installation which is supplied at 220 volts, direct current, comprises a 25-horsepower motor operating at 450 revolutions per minute geared to a line shaft driving five 72-inch chasers. Another 25-horsepower motor operating at 950 revolutions per minute is belted to a line shaft driving four 48-inch mixers and six floor-type mixers. There are two 25-horsepower motors both operating at 450 revolutions per minute, one of which is belted to a line shaft driving six roller mills aind six burr mills, the other being geared to a line shaft driving four 30-inch burr mills and three 20-inch mills. There are five 20-inch burr mills, 11 15-inch burr mills, 11 12-inch iron mills, 30 150-gallon vertical mixers and four 450-gallon horizontal mixers, all driven from a 22-horsepower motor operating at 950 revolutions per minute. In addition, there are two slow-speed 20-horsepower motors belted to putty mills, one 2-horsepower motor for driving printing press, and eight 10-horsepower special elevator motors.



Motor-Driven Chaser.

COMMERCIAL PRACTICE

New Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

EFFICIENCY IN SERVING CUSTOMERS.

Courtesy on the Part of Employees Essential—Meter Readers Should Be Instructed.

In an address recently before a body of Southern central-station men, J. M. Mohl, manager of the Cordele Electric Company, Cordele, Ga., offered some pertinent suggestions relative to gaining the good will of the public through exemplary service.

Efficiency in serving the consumer from a central-station standpoint is a very important and vital issue. No expense should be spared to bring about means that will insure amicable and friendly relations with consumers. The oft-repeated slogan "He profits most who serves best" is worthy of quotation in this respect, and the principle of it should be carried out to the letter.

One of the most disconcerting and disturbing conditions which we have to contend with in the public utility field is "dissatisfied customers." To remedy the various complaints and grievances is indeed a task which is deserving of considerable forethought and study. The ability with which we can adjust complaints or cause them to be adjusted and settled to the customer's satisfaction is dependent upon our attitude towards the complainant. If a customer enters your office in a "grouchy mood" and states that the bill, as rendered, is excessive, the first duty incumbent upon you is to "investigate" why the bill is excessive. Don't "go off the handle" and say that the bill is correct unless you are absolutely sure of your statement. Just so sure as you get into the habit of making statements to your customers, that cannot later be substantiated by facts and reasons, just so sure are you establishing inimical relations, as well as an unreliable reputation for yourself and your company; further you arouse the customer's anger when you say the bill is correct before you have even given thought whereof you speak. Long experience has shown conclusively that it pays to spend a little time investigating the customer's complaint. The fact that you tell your customer that you will investigate, evidences that much more confidence in your willingness to mete out a "square deal."

Another important feature that it is well to bear in mind when dealing with a complaining customer, is to "Keep cool and level headed" at any stage of the game. Don't "fly off the handle" just because your customer is in a state of anger or grouchy attitude, that's just the critical moment when you can display that "Cool and Level Head." That attitude wins for you, superiority over your customer's grouchy attitude, or in other words you have mastered the situation by keeping a cool head. Do not let your customer's attitude be a means for governing yours. You should be in a different frame of mind than your customer otherwise you will have lost your chief aim, that is, to serve your customer efficiently.

Another indispensable feature in efficiency in serving the consumer is that courteous and personal feeling for customers upon their entrance to your office to pay their light bills, make purchases, or for whatever purpose their mission may be. Be acquainted with your customers, address them by name, they will feel complimented, and have a higher regard for you and your company. Again little acts like these are never forgotten, and they tend to make customers forget that they are just coming to your office to pay their bills and that's all. Mix a little "courtesy" and "individuality" in dealing with your customers, don't convey or even have them think for one moment that your company is a "heartless corporation."

Success Depends on Employees' Attitude.

The success and reputation of any public utility is dependent upon the employee's attitude towards the public. Indifferent and inimical feelings towards public utility companies have in a measure been caused by employees failing to recognize, as well as realize, the importance of customer's complaints. Biased and deep-seated prejudice has been allowed to formulate in the minds of customers, as a result of employees' neglect and indifference. The writer recalls reading of a case where the Missouri Public Service Commission ordered the removal of a central-station manager on the grounds of "Inefficiency in Serving the Consumers." The grounds for complaint were reasonable in that he failed to recognize the customer's complaints, as well as the Commission's rules.

The object which should be uppermost in our minds is this, to develop, cultivate, and impart to our employees such standards of efficiency that will mould public opinion in favor of our companies. Be courteous to all: if you have any personal grievances with any of your customers, do not bring such grievances into your business relations with them; always remember that where you are employed by a public utility company you are in the capacity of a servant and as such you are in duty bound to serve the public with fairness.

Efficiency in serving the consumer does not mean that we should only apply it in a case where a customer has made a complaint and afterwards to be remedied. It should be applied with greater force in precluding the possibility of complaints. In other words "an ounce of prevention is worth a pound of cure."

Meter Readers' Attitude Important.

A great deal of success in precluding the possibility of complaints due to excessive bills can be accomplished by meter readers. Their attitude and manner in explaining why their bills increase is of primary importance. Usually the meter reader, if he is wide awake, is thoroughly familiar with the local conditions and can without hesitation tell customers why their bills increase. By observing the social columns in the local papers, the meter reader can keep well informed as to which customers are entertaining and using extra lights. He can also gather good evidence as to why "Mrs. Chronic Kicker's" bills are high by making random inspection visits of the customer's installation.

The writer in managing several small properties has found it a good policy to educate the meter reader to be observing and attentive on his rounds during meter reading periods. The meter reader can assist materially in reducing the number of complaints by applying himself diligently. It matters not how trivial the nature of the complaint may be the meter reader should recognize it, and if he is unable to adjust it at the time, the complaint should be brought to the manager's attention.

Employees' Commissions on Appliance Sales Successful at Cambridge, Mass.

At a hearing before the Massachusetts Gas and Electric Light Commission held in relation to a recent stock increase, Welles E. Holmes, treasurer and general manager of the Cambridge Electric Light Company, said that employees are allowed a 10 per cent commission on the sale of electric appliances, the percentage being figured on the list price of the apparatus. There are usually not less than 88 employees on the payroll, and each of these is encouraged to solicit appliance sales both in and out of office hours. In addition to the commissions above mentioned, the company averages a profit of about $1,000 a month on appliances marketed, although no store is maintained.

Knoxville Street-Lighting Contract to Be Renewed.

Bids for street lighting have been submitted to the city commission of Knoxville, Tenn., by both the Knoxville Railway & Light Company and by the Knoxville Gas Company. The former proposes to provide the 600 6.6-ampere, alternating-current, inclosed arc lamps at $54 each per annum on a ten-year contract, the city being given the right to terminate the contract at any time after five years upon giving of one year's written notice. This is $18.50 per lamp less than the same service is now costing the city. At present the Knoxville Railway & Light Company is supplying the service on the basis of the old contract.

Dayton Campaign Increases Consumption from Porch Lighting.

The accompanying illustration shows an advertisement published by the Dayton (O.) Power & Light Company previous to Christmas in an effort to increase the use of electricity for porch lighting and window lighting in homes. The citizens of Dayton took kindly to the efforts of the company to make Christmas Eve more cheerful, and the company reports that its efforts in this direction were well repaid. The most profitable feature of the campaign, however, is the increased use of porch lighting, which is a permanent result of the holiday experiment.

The Modern Way
The Old Custom of burning a candle in the window Christmas Eve can now be made up-to-date at comparatively no expense.
Burn Your
Electric Porch Lamp
Christmas Eve
A 25-Watt Mazda Lamp can be used
Four Hours
For Less Than One Cent
Welcome your guest and cheer up the passers-by. Get after your neighbor and make it a block of burning electric porch lamps. All together—all the time—for a Greater, Brighter Dayton.
Bell Main 4494
Home 6166
The Dayton Power & Light Co.
50 South Jefferson Street
"Use Electric Light in Your Home This Christmas"

Advertisement of Dayton Company Used in Porch Campaign.

Electric Service for Dixon, Ky.

The city of Dixon, Ky., has sold a 20-year electric light and power franchise to the Clay (Ky.) Light & Power Company, at $1. The franchise provides for rates of $1.25 per month for residence lights and $32 per year for each 500-candlepower street light. Construction of the distribution system is to begin at once and a forfeiture provision is included for unnecessary delays. The current will be transmitted from Clay, where the plant of the purchasing company is located and which is ten miles distant.

Organization of Boston Company's Operating Bureau for Turning Prospects into Customers.

At a dinner-meeting of the maintenance force of the Edison Electric Illuminating Company, of Boston, recently, W. H. Atkins, general superintendent, outlined the manner in which each employee of the Operating Bureau works in conjunction with the whole organization. A drawing showing the force's mutual relations, in the form of a cog wheel, was instituted among those present. On it are represented the relation the bureau bears the prospect and the customer, and below are the various factors which go to make up the "cogs" in the wheels which make a customer out of a prospect and care for the latter when once secured. Each tooth in the wheel refers to the key below the diagram.

"These gears have been grinding away for years, turning prospects into customers," said Mr. Atkins. "The lubrication used is a mixture of devotion and enthusiasm. The wonderful prosperity enjoyed by the company proves the completeness and efficiency of the system.

"Each tooth is an important factor; if one tooth fails, the whole system becomes weakened. The aggregate strength of the gears depends on the efficiency of each individual. The future depends on each individual, the prosperity of the company in turn reflecting in the prosperity of each man connected with it."

PROSPECT TO CUSTOMER	CARE OF A CUSTOMER
1 City Salesmen	1 Stokers
2 District Agents	2 Steam Engineers
3 Special Agents	3 Load Despatchers
4 Service Warrant Agents	4 Electrical Operators
5 Commercial Statistics Agents	5 Sub Station Attendants
6 Commercial Adjustments	6 Battery Engineers
7 Illuminating Engineers	7 Installation Men
8 Power Engineers	8 Meter Men
9 Commercial Engineers	9 Incandescent Lamp Dept.
10 Commercial Wiring Agents	10 Arc Lamp Dept.
11 Electric Vehicle Agents	11 Installation Inspectors
12 New Buildings Agents	12 Maintenance Inspectors
13 Appliance Salesman	13 Trouble Men
14 Electrical Engineers	14 Linemen
15 Advertising Department	15 Underground Repair Men
16 }	16 Electrical Engineers
17 }	17 }
18 } Unclassified Representatives	18 } Unclassified Representatives
19 }	19 }
20 }	20 }

Chart Showing Graphically Organization of Boston Operating Bureau.

SUCCESSFUL COMMERCIAL MANAGERS.

W. R. Putnam.

In an organization such as the Utah Power & Light Company, which maintains a network of transmission lines throughout practically the entire state, there are two distinct divisions to the sales work, either of which are in themselves of sufficient importance and extent to tax the capacity and initiative of an experienced central-station executive. The first main problem is the acquisition of customers in the form of entire communities—entailing careful surveys of prospective business—and the second general problem is the development of power business in each of these communities.

The continual extension of lines to new territory, the tying together of these communities into one comprehensive network, and the promotion of profitable business locally in each of these communities, with a view to developing a well-balanced system are but a few of the duties of W. R. Putnam, sales manager of the Utah Power & Light Company, of Salt Lake City.

Aside from the almost phenomenal growth in extension to

W. R. Putnam,
Sales Manager, Utah Power & Light Company, Salt Lake City.

communities in the territory, under the direction of Mr. Putnam, material extensions have been made into agricultural territory, providing farmers with conveniences enjoyed by their city neighbors. Through these extensions hundreds of new customers have been supplied with service during the past year.

Electric cooking is another feature of the service of the company which has shown decided increase during the incumbency of Mr. Putnam. Domestic science departments of various schools and colleges in the territory are taking up the subject and instructing students in the art of cooking by electricity.

Another interesting feature of the Utah Power & Light Company's work in educating the public in the advantages of electrically operated appliances is the operation of an electric washing machine by every seventh residence customer connected to the company's lines. Also, practically three-fourths of all the company's customers are using electric irons.

It is interesting to note that 96 per cent of all the residences within 300 feet of the distribution lines of the company are using electric service, and 251 miles of interurban electric lines together with 312 miles of street railway lines secure all of their power from the Utah Power & Light Company.

These increases are due largely to the progressive policies adopted by Mr. Putnam. In regard to domestic appliances, he feels that it is advisable to have regular seasonal campaigns covering in the course of the year all devices and appliances using electricity. These campaigns afford an opportunity for special advertising in newspapers and by means of circulars and for displays at the office. They particularly are of benefit due to the spirit of rivalry which is fostered between the different districts. The standing of the districts in different campaigns is worked out on a basis of results secured in proportion to the number of customers in the districts.

Another important item in the sales work which Mr. Putnam has developed is the participation in this work of all employees of the company. In regard to this feature Mr. Putnam says: "Many of our customers are only seen by the meter reader and the office cashier. Consequently the more that we can interest these employees in sales work the better results we secure. We are pleased to report that sales by this class of employees are materially increasing each year."

Mr. Putnam graduated from the University of Minnesota in 1897 and has had 17 years of central-station experience as manager at Red Wing, Minn., and Rapid City, S. D., and as general superintendent at Menominee, Mich., and Marinette, Wis.

Church Societies Sell 500 Electric Irons for Central Station.

Five hundred irons in 10 days is the record of an unusual selling scheme recently employed by the Lincoln Gas & Electric Light Company in Lincoln, Neb. Five church societies were entered in a contest to sell electric flatirons, the society selling the most to receive a $50 gas range, and the society selling the next highest number to receive a $20 range. To each society was given the use of the company's store for two days, and the company advertised in the newspapers that each society in turn would have the use of its display room for the period. The same announcement was also made from the pulpits and thus received a wide and favorable publicity. In addition to the prizes, each society received 25 cents commission on each iron sold during its two days.

The sales were all made cash, and the company's demonstrator and clerk were kept busy demonstrating and wrapping the irons. The women entered into the contest with great zeal. They used the telephone to advantage, calling up members and friends and urging them to "buy now" while the society had charge of the store. The irons were sold for $2.20, but the company was still enabled to show a slight profit. The contest was suggested by J. E. Shuff, contract agent of the company.

Low Heating and Cooking Rate for Washington, D. C.

Reduced rates which are to apply exclusively to energy used for heating and cooking have been put into effect by the Potomac Electric Power Company, of Washington, D. C., and have been approved by the Public Utilities Commission. The new rates are 10 cents per kilowatt-hour for the first 10 kilowatt-hours monthly with a three-cent charge for energy used in excess of this amount. There is a minimum charge of 50 cents per month providing service is used only for heating and cooking. The minimum charge of $1.00 maintained in connection with the lighting rate is the only minimum required where both services are used.

The existing lighting rates are 10 cents per kilowatt-hour for the first 120 hours consumed each month and 5 cents per kilowatt-hour for all energy used in excess.

Baltimore Signs Must Be Lighted.—All electric signs in front of business establishments in Baltimore must be lighted between sundown and midnight. Building Inspector Byrne was instructed by the council to make an investigation throughout the city and report all signs not lighted.

POWER ENGINEERING

Problems Involving Motor Applications, Machine Characteristics, Power Sales Methods and Industrial Electric Heating

IRRIGATION INCREASES LAND VALUE FROM $20 TO $400 PER ACRE.

Installation of Arkansas Valley Railway, Light & Power Company Proves Boon to Farmer.

The Arkansas Valley Railway, Light & Power Company, of Pueblo, Colo., is extending its business throughout southeastern Colorado by encouraging the reclamation of arid land by means of water pumped from wells and reservoirs by electricity. During the past year, the company has installed electrical equipment for pumping purposes in many places and it has not only paid the company a substantial profit but has also contributed to the development of the communities, which, in turn will be further modernized, and, reciprocating, will assist in the growth of the electric company.

The farmer with a few wells and a pumping plant is better established than one using water provided by an irrigation company. In the first place, the cost is usually less and, in the second place, he can obtain water whenever he desires it by simply turning on the power.

Possibly the most unique irrigation project yet developed in the West has been developed one and one-half miles west of Pueblo on what is known as the White-Davis-Stone ranch, owned by Asbury White, S. E. Davis, W. L. Stone and Ben Bergerman. This hitherto practically worthless land has been made productive because of the ingenuity of the owners and the co-operation of the power company.

The West is cut up with arroyos which are apparently dry most of the year and only in flood seasons carry any visible supply of water. Such an arroyo runs through the White-Davis-Stone ranch. Mr. Stone, the prime mover in the adventure, has known this piece of land for 30 years. When he was first acquainted with it, some water ran all year round in the arroyo but only enough to water a few head of stock. Fifteen years ago, it disappeared. Curious to know what had become of the water, Mr. Stone dug a few holes in the dry bed and discovered the water running underneath the surface in the form of an underflow. He watched it for years and ascertained that during the driest seasons water flowed under the dry surface.

Mr. Stone conceived the idea of confining the water and making it reclaim some of the rich arid land adjoining. He interested his partners in the venture and it was decided to purchase the land, 160 acres, and make an experiment.

It was necessary to erect a dam resting on the bed rock to impound the water. This was done. The dam is of concrete 14 feet high and 232 feet long. It is five feet wide at the bottom and one foot wide at the top. Immediately upon completion, the water filled the reservoir and backed up more than 400 feet. An offset in the dam forms a sump from which the water is pumped.

A power line was extended two miles to the ranch and a 15-horsepower motor installed to operate a five-inch centrifugal pump. The dam was on the lower end of the ranch and it was necessary to pump the water through a ten-inch iron pipe line 1,500 feet long to the highest point on the ranch, which point was 69 feet higher than the dam, and from here distribute the water through laterals to the soil.

The construction work was completed in the middle of June and the power turned on. A surprise awaited the owners and the power company's expert, for, when the pump was started, no impression was made on the amount of water in the reservoir and it continued to run over the spillway. The owners had previously considered that there would be sufficient water to irrigate 50 or 60 acres but quickly saw that there would be enough to irrigate the total 160 acres owned by them and possibly 400 more.

The cost of the raw land was $20 an acre, or $3,200 for the ranch. The cost of the dam, the machinery, and the

Typical Irrigation Pumping Plant on Western Ranch.

power line was $2,500 and the total investment came to $5,700. The land is now worth as much as land a few rods north and which is under the Bessemer irrigation ditch and is valued at $400 an acre. The investment has therefore increased to $64,000 or over 1,000 per cent.

Mr. Stone and his partners consider their water much cheaper than that of their neighbors under the irrigation ditch. Water rights cost their neighbors $100 a share which represents one acre. Had it been necessary to purchase water from the irrigation company it would have cost $16,000 to obtain a sufficient supply for the ranch. But the entire cost of the dam, power line and machinery was only $2,500 so they saved $13,500 on this. Furthermore, the cost of providing the water each year is less than $2.00 an acre for the power necessary to operate the pump. Although their neighbors' annual assessment is $1.00 an acre, they have $100 invested for each acre in irrigation stock and that $100 would draw $6.00 annually in interest at 6 per cent. Through the installation of the pumping plant Stone and his partners figure the interest per acre on their water rights as only 93 cents. Since the annual cost for power per acre is $2.00 and the interest 93 cents, $2.93 represents the annual cost per acre while their neighbors pay $7.00.

The success of the adventure has caused the owners to consider purchasing adjoining land to be irrigated under

Vertical Motor Driving Centrifugal Pump for Irrigating Western Ranch.

this project and Mr. Stone to decide to develop a tract of 320 acres lying west of the present project, by the same methods, as there is an arroyo running through it also.

The electric company's annual gross revenue from the sale of power to the two projects will amount to $1,500. The land owners will realize each year a handsome return from the crops raised, and this land will be added to the total acreage of the largest body of irrigated land in the world.

There are hundreds of other similar opportunities for reclamation in the west. Mr. Stone states that he knows of at least 50 places within a radius of ten miles of Pueblo where water can be obtained by the same methods he and his partners used with this one. They soon will be reclaimed by enterprising businessmen and co-operating electric companies.

Government Investigating Use of Electric Power in Fertilizer Manufacture.

In a recent report made by the Secretary of Agriculture regarding the disturbed situation in fertilizer manufacture due to some raw materials being cut off by the war and others diverted to more lucrative markets in munitions of war, he says:

"In view of the difficulties in the way of the production and utilization of sulphuric acid for fertilizer purposes, the Bureau of Soils has endeavored to develop a commercial method involving the use of the electric furnace for manufacturing phosphoric acid, which can be used as a substitute. Through this method double super-phosphate, which will contain 40 to 50 per cent of water-soluble phosphoric acid, or the still more concentrated form of ammonium phosphate, could be secured. But the use of the electric furnace for the purpose is commercially feasible only where phosphate rock, coal, and cheap water power are readily available. The department is investigating this matter to ascertain whether there are localities where these conditions exist and where, therefore, double super-phosphate may be made . . .

"The Bureau of Soils is studying also the problem of the fixation of atmospheric nitrogen with a view to developing a method for the production of ammonium phosphate and other forms of concentrated fertilizers. No ammonium phosphate is being made in this country at the present time. If cheap water power, phosphate rock, coal, and limestone can be found in accessible localities, the possibility of making this material on a commercial scale is considered entirely feasible. The greatest difficulty here is to discover cheap water power at points where phosphate rock, coal and limestone are readily available. The department is making every effort to locate available sources of developed water power which can be used in the manufacture of ammonium phosphate and other fertilizers."

Important Electric Furnace Contract for New Jersey Company.

The Eastern Pennsylvania Power Company, a W. S. Barstow & Company property, located at Dover, N. J., on December 31, closed a contract with the International High Speed Steel Company to supply current for a 1,200-kilowatt Heroult type electric furnace which the latter company is to operate at Rockaway, N. J.

The furnace has a capacity for treating 50 tons of steel per day from an open-hearth furnace. The steel plant is ten miles from the power station at Boonton, N. J., from which current is supplied at 33,000 volts, three-phase. A special type of transformer will be used to deliver current to the furnace. This is regarded as one of the best central-station contracts made in this section in a long time, and is probably the forerunner of others of like caliber.

Electric Heating Economical for Shoe Factories.

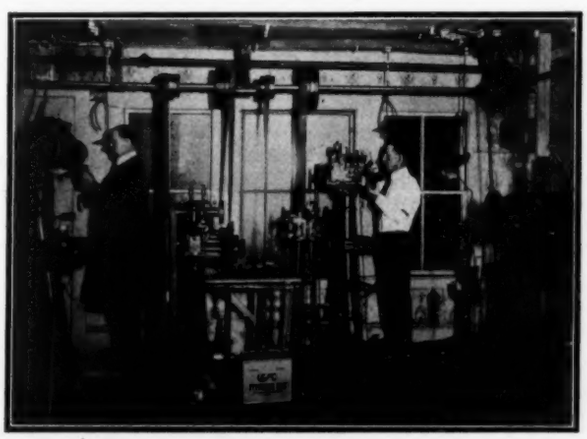
The application of electric heating to shoe stitching, welting and bobbin winding machines is increasing in Massachusetts, where a number of these adaptations have been installed. The United Shoe Machinery Company, Beverly, Mass., has recently placed on the market, for sale or lease, lasting, welting and winding machines with electric heating apparatus for melting wax, creating steam for softening the leather, etc. A shoe factory at Brockton, Mass., which has installed a number of these machines reports marked economies over steam heated apparatus. The introduction of the electric heater in connection with shoe machinery is looked upon as the solution of one hindrance to the motorization of shoe factories, viz., that live steam has heretofore been needed for heating purposes.

A small shoe factory at Lynn, Mass., is completely electrified, using 220-volt, three-phase motors, heating also from the power line and lighting with 110-volt Mazdas.

The equipment comprises: two-horsepower motor driving a Goodyear stitcher, bobbin winder, edge trimmer, heel scourer, finishing shaft, inner sole channeled. A one-horsepower motor drives a Goodyear welter, splitter, welt heater, stitch separator and rough rounder. A 0.5-horsepower motor operates three stitching machines.

The Goodyear stitcher, welter and bobbin winder are all electrically heated. This is found to be a better method, as the heat is more evenly distributed, the necessity for live steam obviated, and space saved. The cost of operation, or energy from the Lynn Gas & Electric Company, is less than $2 per month for the welter and stitcher, and somewhat less for the bobbin winder.

The shop produces about 125 pairs of shoes per week, which are all retailed in the store.



Shoe Machines Equipped With Electric Heating Equipment.

Facilitating Customers' Developments by Carrying Transformer Losses.

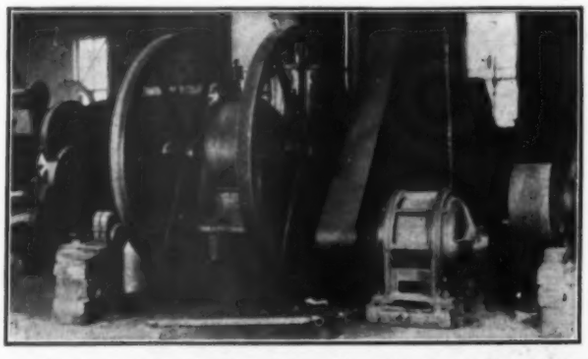
Mutual benefits result from a broad policy in rendering the power customer service of the highest quality, including consideration of his investment requirements as well as his probable energy consumption. In a case decided recently by the Nevada Public Service Commission it was shown that the Nevada-California Power Company in many instances has assisted in the early prospective development of mines by giving customers the benefit of secondary meter readings. The power company has also consented to the purchase by the mining companies of transformers considerably in excess of the capacity needed for immediate purposes in the initial development of the mine in its prospective state, upon the theory that after the development had reached a productive stage, it would, in addition to increased and more constant operation, be necessary to add more electrically operated machinery, mills, etc., thus producing a higher load-factor.

While there are transformer losses in the southern Nevada district ranging from 1.14 per cent to 40 per cent, and averaging 3 per cent, this practice prevents piecemeal investment in transformers, motors and other electrical equipment on the part of the mine operator, and with the hope on the part of the power company that ultimately it will be rewarded for its participation by making the developed mine an exceedingly profitable customer with a good load factor and with only a nominal transformer loss when this is spread over the mine's entire operative period. The wisdom of such a policy and the value of the power company is said to have resulted in bringing forward from time to time large producing mines and mills which thereafter become large and profitable customers.

Trial Motor Installation Gets the Business.

The accompanying illustration shows a vivid contrast between the size of gasoline engine and electric motor required for the same service. This view was taken in a laundry in Brownwood, Tex., where repeated attempts had been made by the Texas Power & Light Company to place electric drive without success. The owner of the laundry was skeptical as to the cost of electric service and finally an offer was made him to put in a motor on trial. He agreed to this proposition and accordingly a 7.5 horsepower motor was belted to the line shaft formerly driven by the gasoline engine. It did not take the owner long to determine which was the best source of power. The 10-horsepower gasoline engine has not been run since the motor was installed and the owner of the laundry has purchased the motor, the trial period having ended.

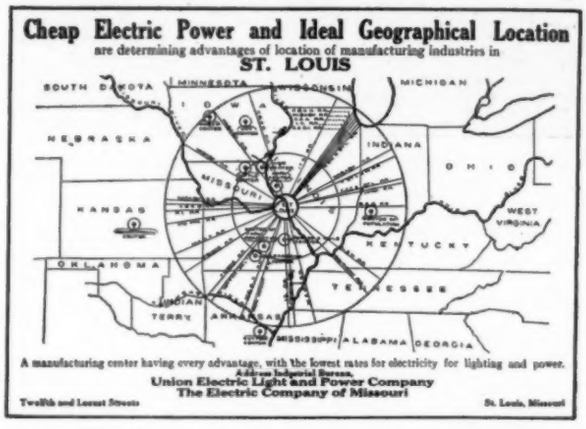
A statement was recently made by one laundry owner in this territory that electric irons saved him 40 per cent over the cost of doing the work by the old method. This saving was made in time and fewer pieces spoiled.



Laundry Installation Showing Motor Alongside of Gasoline Engine Which It Replaced.

National Advertising for Electric Power.

That electric power as an economic asset is rapidly getting away from local limitations is evidenced by an advertisement of the Union Electric Light & Power Company of St. Louis, Mo., in the current number of the *World's Work*. Although the publicity thus prepared features various points of industrial importance pertaining to the company's home city, the part hydroelectric energy is playing in the Mississippi Valley as a result of the Keokuk development makes



Advertisement of St. Louis Company in a National Medium.

such an advertisement of inter-state interest. The radius of effective transmission from many electric plants which have never been more than locally advertised might very well be shown in map form in display matter carried in national magazines, and just as the prosperity of many manufacturers of electrically operated household and shop devices is being enhanced by space purchased in periodicals of nation-wide circulation, so electric power available at low cost throughout large areas is susceptible to similar publicity. The increasing interconnection of central station and transmission networks in the more populous parts of the country point the way toward some very useful publicity for the industry, given a little money plus imagination.

Electric Fire Apparatus Asked for at Springfield, Mass.

Two new motor-driven pumping engines and two ladder trucks, which would complete the motorization of the fire department of Springfield, Mass., displacing 10 horses, are asked for by Fire Chief Daggett in his annual report to the Fire Commissioners. The new apparatus would cost about $36,000.

A large part of Springfield's fire apparatus is electrically driven, the machines being found very efficient. The chief states that the maintenance of horses costs the city $300 each per year, while the upkeep of the electric apparatus, much of which requires three-horse teams, has been brought to an average yearly cost of $230 per piece. The saving which will result from the complete motorization of the department, it is estimated, will amount to $4,500 per year, or about one-half the cost of a new motored machine.

Williston Lighted by Power from Irrigation Project.

Probably the first city to be supplied with electricity by a government irrigation project is Williston, N. D. Rates are 10 cents per kilowatt-hour for lighting and 4 cents for power and electrical appliances. The reclamation department will seek similar contracts at its other projects.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

ELECTRICAL CONSTRUCTION FEATURES OF HOTEL MORRISON, CHICAGO.

Wiring for Light and Power and Telephone and Signaling System Embodies Many Interesting Features.

Modern hotels, especially those in large cities, are examples of practically all that is new in electrical development. Heating, ventilation and sanitation are some of the paramount considerations aside from conveniences to expedite service demanded from such establishments, and all are more or less dependent upon electric power. The equipment must necessarily be diversified and includes lighting and power apparatus, electrically operated kitchen utensils, telephones and numerous other appliances. The successful installation and operation of all such apparatus demands electrical construction of the highest order and this is found in the New Hotel Morrison, Chicago, the subject of this article, as will be seen from the description and illustrations.

The Morrison is located on the south side of Madison Street, between Clark and Dearborn Streets, in the heart of the city's business, shopping and theatrical center, and has a total of 26 stories, three of which are located below the street level. There are about five hundred guest rooms, mostly with private baths, grill room, banquet halls, ball rooms and the well known Boston Oyster House on the foyer floor immediately under the lobby. Aside from the motor-driven laundry and kitchen machinery there are about 65 motors, aggregating 625 horsepower, distributed throughout the building for driving pumps, ventilating fans, vacuum cleaners and other appliances which will be described later.

Power is furnished by three generating units consisting of Westinghouse direct-current 125/250-volt, three-wire generators driven by reciprocating engines of the Corliss type. Two of the generators are rated at 400 kilowatts each, and the third at 200 kilowatts. The balancer coils are located on raised concrete platforms adjacent to the generators and are connected to the latter by four-pole single-throw switches mounted on the generator frames.

All connections between the generators and the main switchboard are carried in conduits beneath the floor. The board, which was built by the J. Lang Electric Company, Chicago, comprises eleven panels: three generator panels, one totalizing

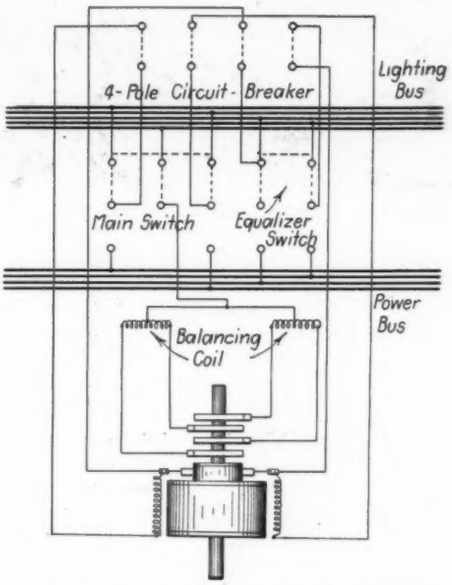


Fig. 1.—Connections of Generator and Switchboard Panel.

panel, one meter panel, four lighting feeder panels and two power feeder panels. The panels are made from two-inch Monson Maine slate with a 3/8-inch bevel on the four edges. All switches are Cutter "FF" type with draw-file finish. The total height of the board is 95 inches and it has a grille inclosure at the ends. Frink reflectors are used in lighting the panels. Each generator panel contains a four-pole Condit circuit-breaker with overload and reverse-current attachments, and pull-down handles; two Weston ammeters; General Electric pilot light; field rheostat; triple-pole, double-throw generator switch, and double-pole, double-throw equalizer switch. Each of the three generators may be connected to either the light or the power load, or may be operated in multiple on one side and the light and power buses connected by a 2,000-

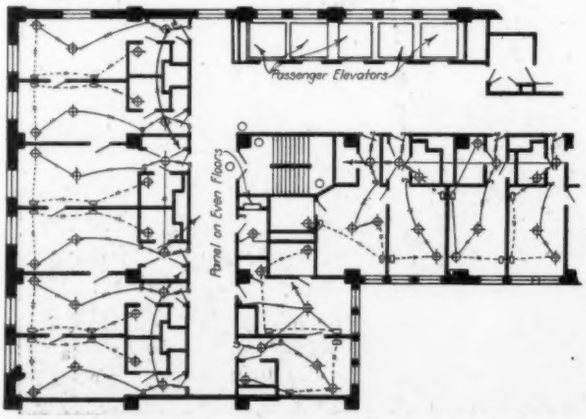


Fig. 2.—Typical Floor Plan of Wiring for Lighting.

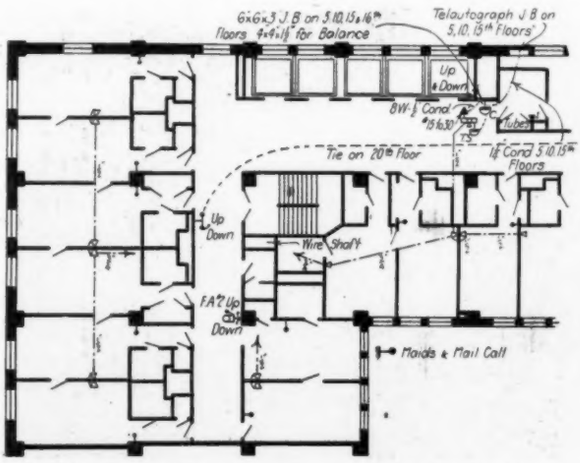


Fig. 3.—Typical Floor Diagram of Telephone Installation.

Fig. 4.—Two Motor-Driven Washing Machines.

Fig. 5.—A Battery of Centrifugal Extractors.

ampere tie switch on one of the power panels. The totalizing panel contains Esterline graphic recording meters for recording the voltage and for totalizing the lighting and power load. The meter panel contains watt-hour meters connected to the various light and power feeders. Fig. 1 shows the principal connections of one generator panel and one generator.

Light and Power Wiring.

All light and power wiring is carried up from the switchboard in conduits to a sheet-steel trough under the ceiling of the engine room which connects with two wire shafts, one at the north end and one at the south end of the building. The lighting feeders are three-wire, 115-230-volt, and the power feeders two-wire, 230-volt, both systems being carried in the same wire shafts. From the balcony to the twentieth floor inclusive there are two junction boxes on the floors with even numbers, one at the north end and one at the south end, for the lighting circuits. Each box feeds a section of the floor on which it is located and a section of the floor immediately below it. There are also a lighting junction box in the pent house, one on the mezzanine floor and one on the foyer floor. The engine room and laundry lights are fed from the main switchboard. The junction box on the foyer floor feeds the ice barn and wine storage room. The junction box on the mezzanine floor feeds the lights on that floor, the lobby lights, and the canopy lights over the entrance. On the balcony floor the junction box at the north end feeds the front banquet hall and second balcony. The junction box at the south end of the balcony floor feeds the second-floor kitchen and balcony-floor ball room. The general lighting arrangement of the guest room includes one center, two bracket, one hall, one table, one bath and one Somno lamps.

All of the lighting and power circuits are carried in rigid conduits from the main switchboard to the outlets. For the lighting distribution from the junction boxes to the outlets, three-quarter inch conduit is mainly used. One interesting feature in connection with the guest-room lighting is the installation of a Hart switch operated from the door lock, so that the lights cannot be left burning when a guest leaves the room and locks it. Fig. 2 shows part of a typical floor wiring plan from the fifth to the twentieth floor inclusive.

For power service there are two junction boxes in the pent house, one for the ventilating fans and one for the elevators; one at the south end of the foyer floor for the kitchen motors; two boxes on the laundry floor and two in the engine room. Other feeders for lighting are roof sign, Boston Oyster House sign, barber shop and tenants' lights in the space reserved for stores.

Elevators.

Elevator equipment consists of five Otis traction-type passenger cars, two service elevators, one push-button freight elevator, nine short-run dumb elevators, and three high-rise dumb elevators running from the kitchen to the twentieth floor. The elevator signals are supplied with low voltage by seven motor-generator sets.

Laundry Equipment.

In the laundry the equipment is interesting not only because modern and complete, but on account of several special construction features. All machines are individually driven by

Fig. 6.—Vacuum Dryer Operated by Electric Fan.

Fig. 7.—Electrically Operated Dish-Washer.

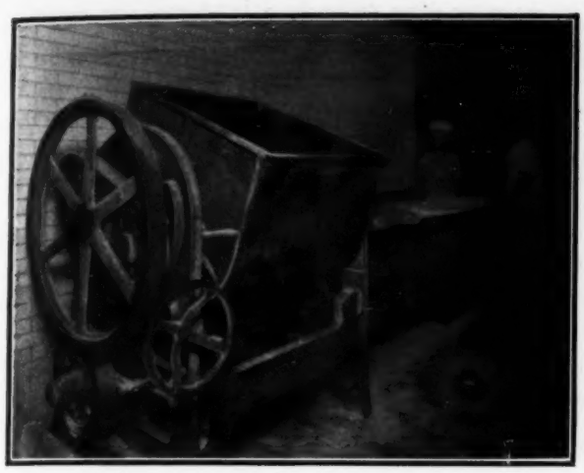


Fig. 8.—Dough Mixer Driven by Motor.

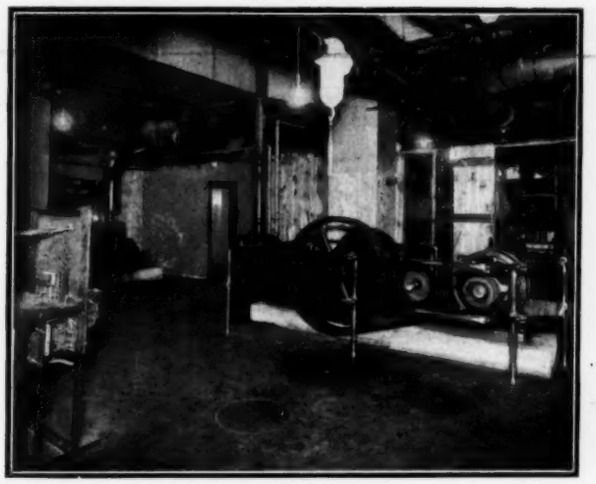


Fig. 9.—Motor-Driven Compressor and Control Apparatus.

motors and there is a complete absence of line shafting with the attendant cleanliness and better lighting, to say nothing of added safety for the operatives. The accompanying illustrations show several of the features. Two Henrici 36-by-60-inch washers, shown in Fig. 4, are driven by six-horsepower vertical reversible motors controlled by a reversing controller, mounted in an iron box with glass front above each washer at the rear. The main switch is located in a steel cabinet on the wall at the right end of the washer. The drive is with gears and a mechanical device is arranged to disconnect the motor mechanically from the washer if desired. One of the modern features of these washers is a dial indicator showing the number of gallons of water in the barrel.

There are three American Laundry Machine Company's 26-inch extractors, shown in Fig. 5, also driven by belted vertical motors. The motor is mounted immediately in the rear of the machine. The switch, fuses, and starting rheostat for each extractor are inclosed in a steel cabinet with a hinged door located at the rear of the extractor and a little on the right-hand side. The cabinet is supported on an angle-iron framework at such a height as to facilitate convenience in starting and stopping the motor.

For the drying of blankets, pillows and heavy work there is an American vacuum dryer, illustrated in Fig. 6, which consists of a large wire-mesh drum, in which the material to be dried is placed, revolving in a galvanized-iron casing in which there is also a motor-driven fan that draws the damp air from the dryer. The motors for revolving the drum and for the fan are rated at three horsepower each, and are located on brackets at the rear of the inclosing case near the top. The motor switch and rheostat for each motor are mounted in similar positions on the front side of the case in convenient reach of the attendant.

At the present time there is a six-roll 120-inch American annihilator driven by a three-horsepower motor for large flat work. Two more similar units are to be installed. For the hand work there are ten ironing boards each equipped with an electric iron and stand. The complete list of motor-driven applications in the laundry follows:

Two 36-by-60-inch Henrici washers each driven by a 6-horsepower motor.

One 36-by-48-inch flat-work tumbler driven by a 2-horsepower motor.

One vacuum tumbler driven by two 3-horsepower motors.

Two American dry rooms each driven by a 1-horsepower motor.

One conveyor dryer driven by a 2-horsepower motor.

One band starcher driven by a 0.25-horsepower motor.

One collar and cuff starcher driven by a 0.25-horsepower motor.

One collar and cuff ironer driven by a 1-horsepower motor.

One collar and cuff finishing table driven by a 2-horsepower motor.

Two body ironers each driven by a 0.75-horsepower motor.

One sleeve ironer driven by a 0.75-horsepower motor.

One bosom press driven by a 0.75-horsepower motor.

One flat-work ironer driven by a 0.75-horsepower motor.

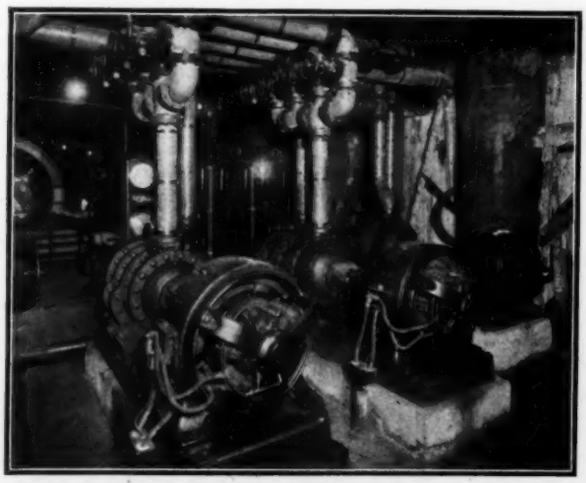


Fig. 10.—A View of the Pump Installation.

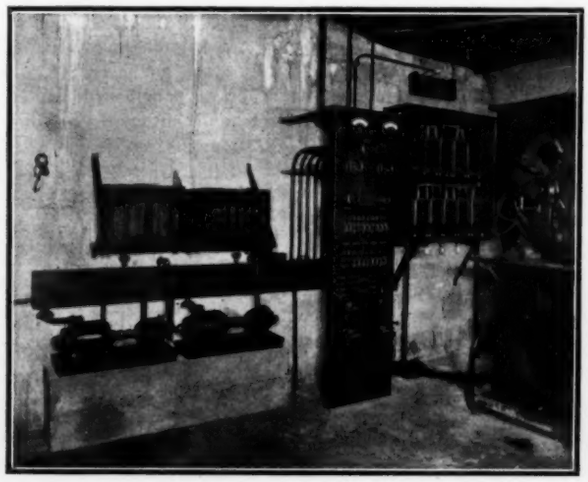


Fig. 11.—Power Board for Signaling System.

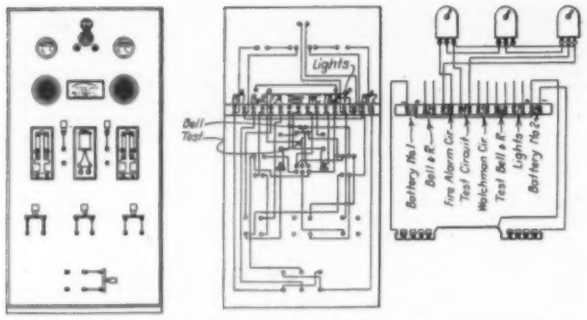


Fig. 12.—Fire-Alarm Switchboard and Wiring Diagram.

One six-roll, 20-inch annihilator driven by a three-horsepower motor.

Five extractors each driven by a 3-horsepower motor.

Three sewing machines each driven by a one-eighth-horsepower motor.

Kitchen.

Similar conditions are encountered in the kitchen as in the laundry in the way of excessive moisture from steam and water. The illustrations of some of the motor-driven appliances will give an idea of the electrical construction. One of the features is the dish washer, Fig. 7, which automatically manufactures the soap it uses from the grease removed from the dishes. Fig. 8 shows the dough troughs. The motor equipment consists of the following applications:

One buffer and polisher driven by a one-quarter-horsepower motor.

Two dough troughs each driven by a 3-horsepower motor.

One potato parer driven by a 1-horsepower motor.

One dishwasher driven by a 4-horsepower motor.

One coffee-mill driven by a one-quarter-horsepower motor.

One buffer driven by a one-quarter-horsepower motor.

One meat chopper driven by a 1.5-horsepower motor .

Miscellaneous Motor Applications.

There are a number of miscellaneous motor applications which are interesting and the outline of the general motor equipment will give an idea of the power requirements of a large hotel. There is a Lamson Miles pneumatic-tube system connecting with various parts of the building, which depends upon direct air pressure for operation instead of a vacuum, as generally employed with similar apparatus. Compressed air is furnished by a Clayton 10-by-16-inch single-cylinder air compressor driven by means of a short belt and an idler from a Westinghouse 30-horsepower motor operating at 725 revolutions per minute. The particularly interesting feature is the manner of controlling the motor, which operates only when the air pressure has reached a predetermined minimum pressure, by means of a Cutler-Hammer electric gauge set for a minimum pressure of 5 pounds and a maximum pressure of 15 pounds. The contacts of the gauge are connected to an electrically controlled motor switch on a panelboard which also contains the main switch, fuses and automatic motor-starter. The panel is supported on an angle-iron frame and all wiring is brought up at the back of the panel in conduits. Fig. 9 illustrates the motor drive, compressor and control apparatus.

As stated before, there are 29 ventilating fans driven by motors, 19 of which are located in the pent house. The balance of the fans are distributed on the mezzanine, balcony and basement floors. Four of the motor-driven fans are used in connection with air washers for supplying fresh and clean air to parts of the building. The balance of the principal motor applications are as follows:

One Palm system vacuum cleaner driven by a 15-horsepower motor.

Two brine pumps each driven by a 20-horsepower motor.

One brine pump driven by a 75-horsepower motor.

One ice-water pump driven by a 12.5-horsepower motor.

One incinerator garbage burner driven by a 3-horsepower motor.

One coal-weighing hopper driven by a 2-horsepower motor.

Automatic stokers in boiler room driven by 7.5-horsepower motor.

Condenser-water pump driven by a 5-horsepower motor.

Printing office driven by two 5-horsepower motors.

The controlling apparatus for these motors are contained in steel panel boxes, either mounted on the wall or supported upon angle-iron frame work as shown in some of the illustrations. Fig. 10 shows a group of motor-driven pumps and control apparatus.

Telephone and Signaling Systems.

Under this heading comes an important part of the electrical installation of a hotel or public building, which must be provided with every possible appliance to insure against accidents due to fire and other causes. First in importance from the latter standpoint is the fire-alarm and watchman's service. The manner of installing the wiring is also of importance. In the Morrison Hotel, the telephone and signal-system wires and cables employ a complete conduit system which utilizes the main wire shafts for most of the risers. A typical floor plan of the wiring is shown in Fig. 3.

The fire alarm and watchman's system consists of 55 stations with the necessary auxiliary apparatus, and was supplied by the McFell Signal Company, of Chicago. The system operates on open circuit, is non-interfering and will register an alarm sent from any box with a part of the wires broken or short-circuited. Such an occurrence would be immediately indicated at the switchboard and the trouble can be repaired later. All branch wires connecting to the boxes are run in conduit securely screwed into the box, therefore broken connections are practically impossible and a moisture-proof system results. The watchman's clock used in connection with the system has a double spring lever movement which with a clock checking attachment is mounted in a polished wood case with a glass front.

The switchboard for the system is located in the engine room, and consists of a slate panel mounted on an angle-iron frame. Mounted on the panel are the switches, test coils, relays and automatic cutout. The board is arranged with two sets of double-throw battery switches, independent switches for all circuits, and separate high-resistance coils, also an automatic relay to cut out the high-resistance coils whenever an alarm is turned in. Two voltmeters are provided which show the voltage at all times. If a break or short-circuit in the line wires, or defects in gongs, registers, etc., should occur, such defects will be indicated on the board by two miniature ruby lamps, placed behind Holophane globes, and a Schwartz electric bell.

The watchman's calls are made by inserting a key in the combination box which registers on the watchman's clock.

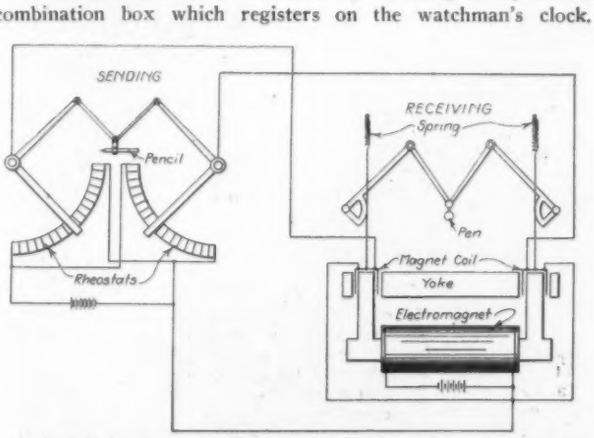


Fig. 13.—Diagram of Sending and Receiving Stations of Telautograph System.

Fire alarms are recorded on a punching register and a gong. In connection with the fire-alarm system there are a number of push buttons mounted on the signal power board, shown in Fig. 11, which connect with fire-alarm gongs throughout the building, two on each floor. Another button connects with a gong for notifying the elevator operators in case of fire, and a master button can be used to ring all of the gongs if the conflagration is serious enough to warrant it. A diagram of the system and alarm switchboard are shown in Fig. 12.

The signal power board is arranged to furnish low-voltage current to other applications and is provided with battery switches, circuit switches, and the necessary controlling devices for two one-horsepower motor-generator sets. The latter are used in connection with two storage batteries and the combination of connections is so arranged that the batteries may be floated across the line, or may be charged and discharged separately.

There is a complete Musolaphone system for paging guests, having 64 stations, with the sending station in the telephone room. The stations are somewhat on the order of a dictaphone and are audible for some distance, so that a call can be picked up in almost any part of the building. Bell telephones are located in every guest room and near every motor or group of motors. There are also two sets of intercommunicating telephones used in connection with the dumb-elevator service.

A Sohm system of synchronous clocks and time stamps connects with all of the principal departments of the building.

To complete the electrical equipment there is an 18-station telautograph system. The principal writing part of the telautograph consists of sending and receiving stations shown diagrammatically in Fig. 13. The person sending the message writes on a paper tape with a pencil so linked with rheostat arms that the motions are split into two components, and the resistance varied in proportion to the components. Each rheostat is connected to a magnet coil located in a magnetic field of constant value. Variations of current in the magnet coils cause corresponding movements between the coil and the constant field. The magnet coils are connected mechanically to arms carrying a pen and the motions are opposed by coiled springs. The pen follows the movement of the pencil and reproduces the motions the latter makes.

When not writing, the receiving pen does not rest on the paper but is made to press against it in the following manner: At the sending end there is an induction coil with two secondary windings connected to each line circuit; pressing on the writing slip changes the strength of the pulsating current that is superposed on the receiver line current to such an extent that a special pen-lifting relay at the receiving station is operated and the pen is held against the paper. The pulsating current produces a slight variation which assists in reducing the friction of the pen on the paper. The paper is moved at the sending station by turning a crank that also operates a master switch and a corresponding movement of the paper is provided at the receiving end.

"Don'ts" for Line Patrolmen When Using Portable Phones.

The San Joaquin Light & Power Corporation, operating at Fresno, Cal., and vicinity, has issued the following interesting and instructive series of "Don'ts" for its line patrolmen when using portable telephones along the company's system:

Don't lose patience when your bell fails to ring. Look for poor connections to line or open in ringing circuits.

Don't "think hard" when your telephone receives or transmits a weak ring. You may have low resistance coils or poor contacts in the ringing circuit.

Don't blame the dispatcher when your telephone rings other bells and your bell is weak. Look for poor adjustments in the bell armature. There may be a high resistance contact in the ringing circuit.

Don't swear when you receive calls on your telephone and cannot talk. Look for a broken cord on receiver, poor contacts in talking circuit, weak battery, if the receiver hook does not go to proper place, or there may be a high resistance ground connected in gap of broken line.

Don't say all you think. When you cannot ring or talk, there may be an open circuit in the telephone or a shorted line.

Don't think the other fellow is chewing gum when the speech is indistinct and has a buzzing sound. Look for loose connections in the battery and transmitter.

Don't think you are dumb when you can hear but cannot be heard. Look for an opening in the primary circuit.

Don't forget that a patrolman should understand his telephone. He may be in need of assistance.

Among the Contractors.

The Richardson Electric Company, Duluth, Minn., has received a contract for the electrical work on the extension of the Reiss Coal Company's Dock No. 1, at Superior, Wis. This contract includes considerable high-tension work and is unique in that one portion of the work alone will require over 5,000 pounds of copper bus-bar three-eighths inch by two inches. The same company has also secured the wiring contract for the M. I. Stewart residence at Crescent View Park and has just completed the electrical wiring at the new Minnesota National Guard armory, Duluth, one of the best equipped buildings of its kind in the western states.

The Blumenthal-Kahn Electric Company, Baltimore, Md., was awarded the contract for the electrical work in the building of Frensdorf & Brown Distilling Company, of Canton, Md. This firm has also been awarded the contract for the electrical installation in the Drovers & Mechanics National Bank. This contract, the largest of the past week, includes wiring for lighting, call bells, vault protection, Turner Dictophone system, etc. C. L. Reeder was the consulting engineer.

W. S. Rosenfeld, Baltimore, Md., has been awarded contract for wiring for the National Yeast Company, at Colgate, Md. About 25 motors were installed which will aggregate about 350 horsepower.

The Electro Mechanical Company, Baltimore, Md., has been awarded the contract for the electrical installation for the Poole Engineering & Machine Company plant now in the course of erection at Texas, Md. The contract calls for wiring for light and power. This plant will cover an area of 25 acres and will be used for the making of munitions of war.

The United Electric Construction Company, Philadelphia, Pa., has been awarded the contract for the electrical equipment for the office building at Sixteenth and Walnut Streets, Philadelphia, at $10,000 and also that of the St. Charles Hotel, Atlantic City, N. J., at $5,000.

Walker & Kepler, Philadelphia, were awarded the contract for the electrical work in the new buildings to be erected at the Pennsylvania Institution for the Feeble Minded at Spring City, Pa.

W. R. Sorgel has severed his connections with the Trester-Sorgel Electric Company and is now located at 138 West Water Street, Milwaukee, Wis., as manager of the Sorgel Electric Company. The business of this firm will be electrical construction, machinery, supplies and repairs.

E. A. Braseth of Grand Forks, N. D., has secured the contracts for wiring the Grand Forks Deaconess Hospital addition, the Hallock, Minn., Co-Operative Store building, the Cando, N. D., City Auditorium, and the buildings of the Grafton, N. D., Roller Mills.

ELECTRICAL MERCHANDISING

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

HOUSE AND DEPARTMENT CONFERENCES ESSENTIAL TO SUCCESSFUL MERCHANDISING.

By C. H. Minor.

In giving this subject proper consideration, it might be well to trace briefly the development in commerce that has brought us to the point where the house and department conference has become such as important factor in the conduct of modern business.

When business was young, man was self-independent, his horizon was limited and his field of activity very small. Production and manufacture were the results of individual work. With the development of transportation, the telegraph and telephone, these individual operations have become more centralized. Industry as we know it was born with these modern means of communication. The growth has been so rapid that within the memory of men now living it has reached its present manifold and complex form. With this development the individual trader disappears. He becomes a part of a big business, no longer the whole of a small business. A group of men now replaces the individual. The reason for such a development seems clear for the following reasons:

Individual action always fluctuates between the extremes of perfection and imperfection. Man alone is influenced by habit, education, environment, temperament and passion. It is a fair statement that the best individual effort is erratic, but the decision of a group of men is reliable. The individual may be a dreamer, he may prophesy and theorize, but seldom are a group of men given to dreaming.

So with our modern business we have developed organization, system and business efficiency. How can we secure the greatest success? There will always be differences of opinion and the only way to "understanding" is through frank discussion with a spirit prepared to make concessions. This is therefore the reason for the house and department conference.

A standard organization should be so arranged that the lines of authority are clearly delegated and the activities of the several departments strictly defined. My idea of such an organization is one in which there is an executive head, charged with administration, surrounded by an executive committee consisting of the heads of the departments for sales, finance, stores, production and engineering work. It is the duty of this committee to outline the general company policy and the broad lines to be followed in carrying out this policy.

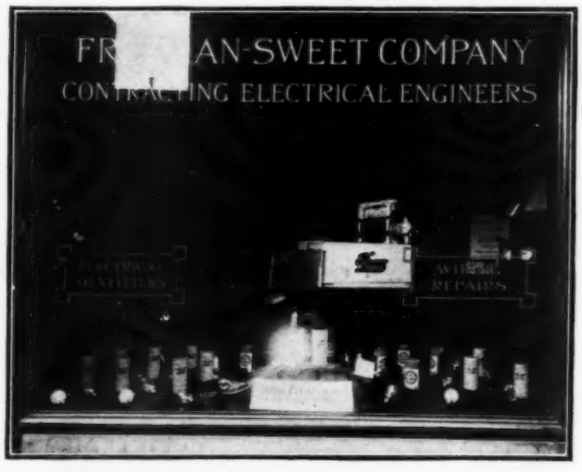
The house conference presents the best means for accomplishing this work because it instills enthusiasm and co-ordinates all parts of the business. The greatest danger of all is lack of a proper recognition of the close interdependent relations between departments. The house conference is primarily educational. No firm ever impressed the world with its slogan "Service First," "Every Customer a Satisfied One," etc., without first selling its policy and program to its own employees through house conferences.

We may well say that the idea of the house conference is to emphasize the importance of the idea of "co-operative house protection." We may summarize the advantages of the house conference in these words: It educates, co-ordinates, harmonizes, humanizes and stabilizes modern business. As we follow the expansion and development of business, the problems arising in the various departments make the need for department conferences just as great and the results to be obtained just as important.

Now, if the conference is the most efficient way of handling modern business, it is also the most expensive. Therefore, the need of a definite policy, a specific and clearly outlined program for conducting the conferences. Finally, make the effort co-operative and constructive.

A Suggestion for a Battery Display Window.

Realizing the unappealing character of the ordinary window display of dry cells, the Freeman-Sweet Company, Chicago, Ill., recently decided upon the display



A Battery Display Window That Attracted Attention.

shown in the accompanying illustration. In the center of the window, surrounded by rows of dry cells of various manufacture, was placed a platform, slightly raised, upon which was mounted two ordinary dry cells apparently supplying a 250-watt incandescent lamp. Under the display was placed a card bearing the following inscription: "Some Batteries, highest efficiency at all times."

The display attracted considerable attention and it is stated resulted in boosting battery sales during the week it was maintained.

Sicilian Buys American Electric-Light Carbons.

The Catania Street Railway & Lighting Company, of Catania, Italy, has placed an order for 19,400 American carbons as the result of a foreign trade opportunity published in *Commerce Reports*, the daily publication of the Bureau of Foreign and Domestic Commerce. This initial purchase of American lighting supplies for Catania is important in that subsequent orders will follow, in all probability, for other cities and towns in the district. As a rule, the difficulty lies in securing the initial order.

Business Hints for the Electrical Dealer

Care Necessary in Estimating Repair Work—Economy Results in Providing Repair Men with Complete Equipment for a Specific Job —Big Opportunities for Sales to Office and Apartment Buildings

By G. D. Crain, Jr.

The Hasty Estimator.

Not long ago a customer walked into the establishment of a leading contractor, who makes a business of repairing motors and other electrical equipment.

"I've got a motor out here on the wagon," he said, "and I want you to put it in shape. How much will it cost?"

The electrical expert had the machine brought in, looked it over, as he thought, carefully, yet with a certain amount of haste, and finally said, "I guess we can put this in good running order for $10."

"All right, go ahead," replied the owner of the motor, walking out.

A little later on, when the shop got to work on the job, it was found that the bearings of the motor were burned out, and that to put it in first-class condition these would have to be replaced. The repair man telephoned the customer and called his attention to this feature of the proposition, asking whether he should renew the bearings as well as the other defective parts.

"Sure," was the reply. "You agreed to put it in good running order for $10, so go ahead and do it!"

And though the contractor, amazed that he should be taken so literally, pointed out that he had not intended to include the bearings in his estimate of the cost of the job, the customer was just unreasonable enough—and there are many like him—to take advantage of the agreement and to insist that the bearings be replaced at the original estimate. The work was finally done for $10, and the concern which did it lost money, of course. But its head has learned a lesson, and that is not to make a binding estimate without knowing every detail of the work which is being figured on.

"After we open up a motor we can tell what will have to be done to it," he said recently. "But to attempt, without a thorough knowledge of the entire proposition, to make a binding estimate, is to gamble; and the customer usually gets the benefit. Be sure you're right and then go ahead is an old-time proverb, but it's the correct dope in this business."

What About the Demonstrator?

Should demonstrators be furnished without charge to the dealer who is handling an electrical specialty?

This question is suggested by the experience of a well-known member of the trade, who took the agency for a certain advertised machine some time ago, paying the regular price for one to use as a demonstrator. He tied up about $60 in the specialty. After working on his local field for some time, and finding it more or less difficult to sell it, with his limited opportunities for getting out and doing personal solicitation, he decided to let the agency go to somebody else.

Now he has a second-hand machine on his hands, and will have to sell it at a good deal less than it cost him. The manufacturer got the benefit of his efforts, and made a profit on the machines which were sold. True, the number was not satisfactory, either to the maker or the dealer; but certainly the latter did not make an excessive margin on the goods he disposed of, and it took a good deal of effort to get them going. Should he be penalized to the extent of having to absorb the loss involved in the reduction of a new machine, used for demonstration purposes, to a second-hand condition?

This is one of the numerous problems involved in getting relationships between manufacturer and dealer on a basis which will be fair to everybody, and will encourage, rather than discourage, the local distributor who is trying to develop the merchandising end of his business.

Find Out What Is Needed.

The average electrical shop is crowded with work of a minor nature. At this time of the year, especially, when new construction jobs are few in number, the crews are kept busy chiefly on repair work. Most of the calls are of an emergency nature, the customer wanting quick service, and being willing to pay more than the job is worth intrinsically for the sake of having the matter attended to without loss of time.

These are conditions which emphasize the necessity of finding out from the customer just what the work is, so as to take along the necessary materials. Ordinarily a workman cannot carry in his kit a great enough assortment to cover the requirements of any given job, for the obvious reason that there are too many kinds of each item. He has some things, but they are not expected to cover the requirements of the job.

If the person who takes the order for the work gets merely a hazy notion of what is to be done, there is a possibility of the workman having to return to the shop for the materials needed, or to wait while they are sent out. Either development not only delays the completion of the work, but tends to irritate the customer and to give the impression that the electrical business is run as the cartoonists insist the plumbers run theirs. The latter have had a hard time living down the reputation which has been handed them, and without attempting to decide whether or not it is deserved, it is certain that no electrical contractor wants his customers to get the idea that he doesn't know enough about the business to have his men take with them to every job the materials which they will need on that job.

If all of the items are ascertained in advance, the electrician can handle the work in short order, and the customer, as suggested, will pay the bill, even though it involves a charge based on the emergency character of the work, rather than the actual cost in labor and materials, with much more grace than if he had an idea that delays caused by waiting for material had been figured into the bill.

Is This Good Business?

A certain electrical dealer is now handling a specialty line on a 20 per cent margin. That is to say, the manufacturer has fixed the retail price, which is widely advertised in the magazines, and the dealer's discount is one-fifth of that.

This specialty is not well known enough as yet to sell without effort. On the other hand, the dealer has got to do considerable advertising work on his own account. He is spending money in circularizing, he is giving up window space to it, and he has used some newspaper advertising. In addition, he sends out solicitors whenever a

good prospect is turned up, either by his own or the manufacturer's publicity work, and makes an aggressive effort to put the sale over.

The question is, is a 20-per-cent margn sufficient?

The writer, without desiring to criticise the sales policy of the manufacturer, is firmly of the opinion that it is not only too little, but that the dealer is losing money on the business which he is handling.

In the first place, few retail stores can be run with an overhead expense of less than 20 per cent of sales. Groceries, with a rapid turnover and relatively cheap locations, manage to sell for less, but they are exceptions and not the rule. The ordinary store, where the goods are put in stock and sold over the counter without any special effort, cannot get out without paying out 20 per cent of its receipts in the necessary expenses of running the business.

Now, when there is added to the regular cost of doing business the additional special expense of exploiting some particular line, it is only fair that this line be charged with it. If this were done in the case noted, it is evident that the dealer would have to pocket a loss measured by the amount of development work which he did. Of course, if a big volume of business were put on, this would help to reduce the overhead, and thus would create a somewhat bigger margin; but it is doubtful if the reduction in the percentage of overhead would be sufficient to absorb the extra expense.

Now, these statements are made not for the purpose of making any dealer who is satisfied with 20 per cent discontented with the situation. On the other hand, most electrical merchandise dealers appreciate the fact that they need a bigger margin, and they are far from enthusiastic over a line which does not give them enough to justify hearty and aggressive co-operation with the manufacturer.

It would be good business for the latter, good business for the dealer and good business all around if the fact were recognized that it costs money to sell at retail, and that the dealer is entitled to a net profit. He cannot be expected to hew the wood and draw the water without any recompense, and asking him to do a lot of special work for a new line without getting a reasonable return on his investment of time and money is not calculated to get the best results for anybody.

Study Big Buildings.

The average electrical contractor gets a good deal of work, first and last, from the big office buildings in his community. Changing lighting fixtures to suit the requirements of individual tenants is one kind of work which results in frequent calls, for while some of the buildings have their own electricians, who are available for this sort of thing, most of them are so operated that the tenants usually call in contractors from the outside.

All this suggests not only that it is good business to keep the numerous office people in mind in advertising, and that an occasional circular sent to every concern in every large building would be a good thing; but also that it would be a splendid idea to have specific data at hand regarding the electrical equipment of each building. Such a simple proposition as the kind of receptacle provided in the various rooms would indicate the type of plug to send out on such jobs; and the description of the switches and fixtures, which would have to be matched in any new work, would also help. This information would enable work to be done much more economically and readily than if it had to be looked up every time anything was to be handled in a given building.

Gene Cashman, for four years connected with the city electric light plant, has opened an electric shop for the sale of fixtures and lamps and for contracting at Elm and Webster Streets, Chillicothe, Mo.

Fixture Sale Predicated on Satisfactory Lighting Installation.

General lighting for offices, rather than individual desk fixtures, is coming to be recognized as the more efficient and desirable mode of illumination. An installation of this type which is regarded as one of the most attractive in New England, is that of the accounting department of the Manufacturers' Outlet Company, located at Providence, R. I.

This installation consists of 49 fixtures for this floor, which is 70 by 72 feet square, besides which 24 similar fixtures have been installed for another department. The single-chain old brass fixtures are employed, with 14-inch Alba non-roughed Macbeth-Evans Glass Company hemispheric glass, burning 150-watt type B Mazda lamps. The ceiling is 11 feet high, and the total length of fixtures is 42 inches.

A remarkable feature of the installation, which was done by the Boss Electrical Supply Company, of Providence, was the fact that the office was about completed at a busy time of year, when the manager of the bookkeeping department thought that time would have to be sacrificed in placing all the desks with reference to individual illumination, with the running of iron conduits along the floor and the equipment of each desk with condulet fittings, and outlets for desk lamps. The contractors' plan for a general scheme of lighting, by which the desks might be located anywhere on the floor and receive about equal illumination, met with the company's ready acceptance.

The outlets in the ceiling are spaced 5 feet 6 inches from the back wall and 6 feet from the side walls, and those apart from the outside rows are 10 feet apart on the square. A line of four units is directly over a corridor petition and single fixtures are over the center of each of four private office rooms. Energy is furnished by the Narragansett Electric Lighting Company.

Lamp Sale in Chicago.

A special sale of portable lamps is being held by the two Electric Shops of the Commonwealth Edison Company. Special prices are being offered during the sale with the idea of clearing out the remaining holiday stock to make room for spring goods.

One of the most attractive displays recently shown in the Edison Building Electric Shop may now be seen in the south window of the Clark Street entrance. The background of the window is draped with Chinese cretonne and the entire window is filled with a very choice display of imported Chinese bronzes and porcelains, which were picked up by the manager of the Shop in New York studios and importers' salesrooms and brought to Chicago, where they were wired and fitted from special designs and equipped with specially designed silk shades, the fabrics of which were selected to match the bases. This is probably one of the most complete and unique displays of Chinese-pattern portable lamps ever displayed in Chicago.

New Electrical Store for Gary, Ind.

The Lighthouse Electric Company, of which A. B. Harris is president, has purchased the stock and fixtures of the A. B. Harris Electric Company, 570 Washington Street, Gary, Ind. The store will open again with a complete stock of electrical goods, lamps, etc. The Lighthouse Electric Company was recently incorporated for $10,000, the incorporators being A. B. Harris, W. P. Cottingham, assistant city engineer; Frieda E. Cottingham and F. B. Shain. The business will be under the management of Mr. Harris and Mr. Shain.

CORRESPONDENCE AND DISCUSSION

A Reader's Page Wherein Opinions on Topics of General Interest May Be Expressed

Grounding of Secondaries.

To the Editor:

I have read with a greal deal of interest Terrell Croft's article in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of January 1, on Transformer Wiring Practice. That part of the article relating to the grounding of secondaries is particularly interesting, for the reason that it agrees absolutely with a growing opinion that while such grounding reduces somewhat the life risk, it automatically increases the fire hazard. But it might be said further in this connection that risk to life is always attendant in fires of any consequence.

It must be taken into consideration that on grounded systems there is an extremely dangerous element commonly found upon reinspections of older equipments, especially in dwellings, but not present in ungrounded systems, which may not have occurred to Mr. Croft. It frequently occurs that a fuse will be blown in a cutout on a grounded secondary system and the repairman or the owner of the equipment, for the purpose of continuing service temporarily, "bridges" the terminals of the cutout on the open side. This in the majority of cases becomes permanent through neglect to repair. The general presumption on the part of the average electrician or repairman is that the remaining fuses will protect the circuit in the event of trouble recurring until the blown fuse is replaced, and the "bridge" removed. It will not only be appreciated that automatic protection on such a circuit has been absolutely eliminated, but what the result will be in the event of a ground occurring or reoccurring on the clear side.

Herein exists the potential hazard in the concentric and similar one-wire systems, where but a single fuse is originally provided and a fire loss is inevitable where this fuse is bridged.

We have found in practice, where the secondary ground is effectual (and it must be if considered of any value) and where the clear side has been bridged, that by an accidental ground on the bridged side, the remaining fuse does not operate for the reason that the current finds an easier path by the way of the secondary ground wire and even though the fuse should operate, the results would not be altered.

After conducting an inquiry it was learned that the breaking down or collapse of transformers annually is surprisingly low, it being estimated at less than one-half of one per cent. It was further learned that accidents due to crosses between primary and secondary lines are remarkably small, this being probably due to a more rugged grade of line and service construction, than was obtained in former years. It is not my intention, of course, to take issue with any part of the very able article by Mr. Croft, but for the purpose of bringing out more clearly some of the points passed upon, I should like to have an expression from him as to whether he does not believe that the fire and life risk are abnormally increased due to the grounding of secondaries on 100 per cent of transformers for the purpose of anticipating accidents to less than one-half of one per cent of actual failures or collapses. It is noted further the excellent suggestion by Mr. Croft that the secondary ground conductors and connections should be thoroughly inspected at least once per year and it would be interesting to have a general expression from those interested as to whom the responsibility should rest upon in making such periodical inspections, that the users of the appliances who feel immune from accidents due to the knowledge of having the secondaries grounded may not meet with an accident or fatality by being deceived as to its effectiveness.

C. H. Hill,
Chief electrical inspector, Underwriters' Association of the Middle Department.

Philadelphia, Pa.

Timeliness in Electric Vehicle Sales.

To the Editor:

I have read the editorial, "Timeliness in Electric Vehicle Sales," in your issue of December 18, 1915, with much interest.

Much of the street traffic congestion which invariably follows the arrival of heavy snow in our larger cities is unquestionably due, as you suggest, to the horse getting in the way. He is out of his element under snow conditions in a city and those who use him must pay a high premium in the premises.

In this connection one of the New York newspapers has announced, recently, that its publishers will use their influence to have a state law enacted to compel all horse owners to keep their animals caulk-shod during the winter months. "A poor winded animal, straining and slipping in the effort to drag a heavy load over an icy surface upon which smooth shoes give him no foothold," states a recent editorial, "is a sight as painful as it is frequent." Probably such an ordinance would be a step in the right direction but it would not materially relieve traffic congestion. Such a congestion comes from horse-drawn vehicles blocking each other in narrow cross-streets, or at corners and when street cars get into the center of such a jam, hours of delay and inconvenience frequently result. That traction companies are continually seeking some remedy, legal or otherwise, to prevent heavily loaded (mostly horse) vehicles from monopolizing their tracks when the snow is piled high on each side is well known. The motor truck can at least turn out for a street car and the electric truck is particularly dependable under such adverse weather conditions, as you have intimated. If properly charged it will give splendid results. It is easier handled, needs practically no adjustments while on the road and because of its simplicity of construction, especially as to driving mechanism, it does not need the repair shop at the end of the run. Here in New York some of our electrics are worked 20 and 22 hours a day during stormy weather just because they can be kept on the road.

I quite agree with you that it would be helpful to the industry if some means could be found for consistently emphasizing the merits of the electric at a time when so many delivery systems are crippled, but I am afraid it is not feasible to place a truck in the service of a "July prospect" at the first heavy fall of snow. The demonstrating plan is something which we nearly all agree is an

evil to be avoided. To properly demonstrate the relative efficiency of the electric at such a time would require in Chicago alone from 50 to 100 of our trucks and then we would risk offending several hundred other prospects whose "problem" could not be covered in view of the time element involved. Blizzards, zero weather and icy streets carry their own indirect appeal to the prospect. One wholesale grocer using horses sees a competitor who uses electrics making deliveries on schedule while his whole system is demoralized and he cannot help asking himself if electrics are not what he should have. It requires a lot of patience to wait for the sheer merit of the electric as developed by contrast to bring one a large percentage of his business but it seems to be, if not the best way, then at present the surest way.

Your editorial but emphasizes in a new way a question which is bothering scores of friends of the electric, viz.: to what extent will aggressiveness in introductory methods increase the sale of electric trucks? If merchants knew or could be convinced, readily, what horse equipment cost them it would be easier to *force* the electric truck market. It seems to be a question of evolution with most team owners—a matter of education, in which salesmanship, often of the very highest kind, avails little so far as cutting down the period of deliberation is concerned. I rather feel that motorization must take its time—must await both education and the available resources to make the turnover from one method to another.

The situation is very interesting, many-sided and at times confusing, but I am confident that the electric will be well represented at the finish.

P. D. Wagoner,
President, General Vehicle Company.

Long Island City, N. Y.

To the Editor:

I read the editorial on "Timeliness in Electric Vehicle Sales" in your December 18 issue and think it very pertinent. The operator of an electric truck, however, dreads snow storms probably as much as the man who has a horse-drawn vehicle.

I saw an item in the newspaper a few days ago saying that a party in New Jersey used oxen in place of gasoline autos for delivering goods during a recent snow storm.

The electric car can go through the snow better than the gasoline or horse-drawn vehicle while the battery holds out, but the mileage is cut down very much and at present there is not a sufficient number of charging stations available.

Arthur Williams, a former president of the Electric Vehicle Association of America, said some time ago "that there was a dearth of garaging facilities," but the industry does not yet realize the truth of this statement.

At present we have garages that take care of pleasure vehicles on a flat-rate basis but such an arrangement is altogether unsuited to the needs of the commercial vehicle.

R. Macrae,
Vehicle engineer,
Commonwealth Edison Company.

Chicago, Ill.

Need for Electrical Clearing House.

To the Editor:

Your editorial on "Organization," in the issue of November 27, 1915, appealed very forcibly to the writer who is a strong believer in "organization" in any kind of work or play. In a recent bulletin of the Electrical Credit Association of Chicago the following Elbert Hubbard story was given:

"Not long ago Hubbard had occasion to visit a hospital for the insane. Walking over the grounds one morning he came across an attendant in charge of 25 patients. The attendant was a little chap, a sort of half portion. Many of the patients looked and weighed twice as much. Hubbard's curiosity was aroused. He joined the attendant in his stroll. Hubbard was all questions and asked, 'What is to hinder half a dozen of these big fellows getting together and fleeing to the woods. You wouldn't stand a ghost of a show. There is no help within half a mile at least and you are not armed.' The attendant looked at his questioner severely, then smiled, and replied, 'You belong right here yourself; what is to hinder these men getting together and setting up a job on me? Why, the fact is, if they could get together with anybody or anything, they would not be here. That is their trouble.'"

The bulletin then goes on to make the point that "organization is the badge of sanity."

Most people in the electrical industry now recognize the value of a well organized factory or sales force but there are a good many who cannot yet see the value of an organization made up of people or companies in any branch of the electrical industry. This is perhaps partly due to the independent spirit of us liberty-loving Americans but it is nevertheless a mistaken idea. Several different branches of the industry have organized and are doing some real good such as the National Electric Light Association, the Electric Power Club, National Electrical Contractors' Association, the Associated Manufacturers of Electrical Supplies, etc. These are composed of men or companies in some particular branch such as central-station men, wiring contractors, motor and generator manufacturers, manufacturers of wire, insulators, etc. These associations have met and the members have had a chance to discuss the particular problems of their line informally with each other, besides finding out that the other man was a pretty good fellow after all and didn't have horns hidden under his hat. They have formally discussed the vexing questions of their business and slowly matters are taking a much better shape. There is still much to be accomplished and these organizations should have the support of all companies instead of a few hanging out and reaping the benefits of the work done by the organizations without sharing any of the expense.

Because there are so many organizations in this big electrical industry of ours, they sometimes lap over in their activities in a more or less serious manner. This is a point which as time goes by the organizations are slowly remedying by reaching agreements as to just what line of work each shall take up. This is only fairly started but a great deal along that line remains to be accomplished to make these organizations efficient and it will be accomplished to an increasingly large extent in the next few years.

The leaders in these organizations are beginning to feel very strongly that something more is needed to help and hasten the efficient solution of this question. There are many subjects that are of vital interest to the whole industry and so do not come in the province of any one organization alone. There seems to be the need of some sort of federation, clearing house, or whatever you want to call it, composed of representatives from all organizations in the electrical industry to which these bigger, broader, national questions can be referred for solution and action. Something similar to the national chamber of commerce is perhaps what is wanted.

Such an organization working along lines morally just and right and not trying to put over deals for the selfish interests of any man or group of men can do the electrical industry an inestimable amount of good. This organization within organizations or rather organization on top of organizations is coming and will be a tremendous force for right and justice in the industry.

Harry N. Gilbert,
Roth Brothers & Company.

Chicago, Ill.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be received preferably within ten days of the date of publication of the question. Payment will be made for all answers published.

Questions.

No. 322.—JOBBERS' TRADE NAMES.—Is the common custom of jobbers of putting their own firm name or some special trade name on articles (thus disguising the real manufacturer) regarded as good commercial practice? Does it promote sales? Does it not injure the interests of the manufacturer to have his products sell under several trade names?—W. T. K., St. Louis, Mo.

No. 325.—CAPACITY-FACTOR OF CENTRAL STATION.—In a town of 10,000 or less, having a fair day load, the peak being composed of store and residence lighting, what is the proper ratio between peak load and rated capacity of the station? I am supposing that the central station makes little or no effort to increase the power load and absolutely no effort to push appliances.—F. H. G., Columbus, Neb.

No. 326.—AUTOMATIC ELECTRIC HUMIDIFICATION.—Are any automatic means available through which an electric water-heater could be controlled from a humidity instrument so as to cause the heater to boil water when the relative humidity has dropped to, say, 30 per cent and be cut off when the humidity has been raised to 40 per cent? Would such a device be practical and reliable?—M. T., Lansing, Mich.

No. 327.—REDUCING GLARE FROM TABLE LAMPS.—I have observed that practically all table lamps cause eye strain to children reading or playing on the table by shining glaringly directly into their eyes, if the children are not sufficiently tall to have their eyes screened by the shade or dome. Can anything be done to reduce this glare, aside from using full-frosted lamps?—P. M. C., Lockport, N. Y.

No. 328.—FLAME ARCS.—Where series flame arc lamps, such as those used for Chicago street lighting, feed at intervals much less than one minute is it due to poor adjustment of the lamps or to some inherent characteristic?—B. D., Chicago, Ill.

Answers.

No. 321.—CO-OPERATIVE METER READING.—In one of the large cities I have observed that both the gas company and the electric company send out their inspectors to read meters in several districts on identically the same day. Both these companies are active competitors, although there is a community of interest among them. The electric company has been proclaiming that it practically serves its residence customers at a loss, due to the high cost of meters, meter reading, billing, etc. It seems to me that by uniting the meter-reading work in a single crew the cost of meter reading would be materially reduced. Now what I would like to know is whether any state utility commission has passed on this point, namely, allowing competing utility companies to co-operate on meter reading for the joint benefit of both the companies and of their customers, most of which are in common.—A. Z., Spokane, Wash.

A direct answer to this question is no, or at least not to my knowledge. I have followed the decisions of the state commissions quite closely without coming upon this point. It may be seriously questioned whether it is a matter within the province of commission regulation. The companies furnish utility service of entirely different character, one supplying gas and the other electricity. The very fact that the majority of their customers are patrons of both companies indicates that with these customers it is not a question of gas in competition with electricity, but that they want both, doubtless for different purposes. If it were a case of two gas companies competing or trying to compete for the same business, or of two electric companies doing likewise, it would be a matter for consideration by the commissions in those states where the commission can prohibit or regulate competition in the same class of utility service. Many of the state commissions do not possess this power.

Whether any commission with authority to regulate competition between like utilities would prohibit the proposed co-operation, even in the case of two electric companies, for instance, is doubtful. The more advanced utility commissions are aware of the folly of utility competition and are trying to replace it with either regulated monopoly or co-operation.

Although I have never heard of the proposed plan being used except by combination gas and electric companies, in which case it is a source of considerable economy, the only objection I can see to it is the possibility that a careless or unscrupulous meter reader might favor one or the other company. This could be avoided by care in selecting competent and trustworthy men. It seems to me that the co-operative scheme might easily be extended to the delivery of the bills by a single group of men so as to avoid duplicate labor and cost in this item also. The division of the cost of all the co-operative work could be based on the relative numbers of bills delivered and meters read per day.—L. R. F., La Crosse, Wis.

No. 323.—ELECTRIC HOUSE-HEATING IN THE SOUTH.—Where electric radiators are especially suitable for taking the chill off rooms on some cool mornings, as is the case in the South, is the expense of the special heating circuits required by some inspectors warranted by the comparatively little use these radiators would receive?—L. S. M., Galveston, Tex.

From the way this question is put it is evident that L. S. M. does not think this additional expense is warranted. In this case he should not attempt to use any radiator load on the circuits installed in excess of their allowed rating, 660 watts. A 660-watt radiator will not heat a very large area in the large rooms customary in many southern homes, although if local warmth only is needed it will provide that satisfactorily. If larger radiators are to be used, it should be remembered that the special circuits they will require will be of service for other electrical purposes also. In the South electric cooking should meet with favor because of the fact that it does not appreciably heat the kitchen or other room where it is carried on. The convenience and comfort resulting from the liberal use of electric fans and other electrical appliances should make a special appeal in the Southland. To permit the use of such devices on a generous scale requires that the wiring be of liberal size and provided with numerous outlets.—E. P. K., Cincinnati, O.

No. 324.—CIRCUIT-BREAKERS FOR MOTORS.—In some cities the use of circuit-breakers in place of fuses, or without auxiliary fuses, is permitted where there is efficient supervision. What constitutes "efficient supervision" under these circumstances?—C. E. U., Chicago, Ill.

The exact shade of meaning of "efficient supervision" must be determined by the inspection department having jurisdiction over the motor installation. In general it involves frequent and regular supervision by a competent electrician. The inspector can easily satisfy himself by questioning whether the electrician in charge understands the general functions of circuit-breakers, starters, fuses, etc., and the operation and proper care of the circuit-breakers installed; he should ascertain what the duties of the electrician are and whether they include the regular inspection of the motor equipment. By observation he should see whether the electrician acts as though he could easily take care of all his duties without shirking regular inspection of the motor circuit-breakers. If the inspector is satisfied on these points and on the character of the circuit-breakers used, he can safely permit the omission of auxiliary fuses.—H. D. Y., Harrisburg, Pa.

PUBLIC SERVICE COMMISSIONS

A Resume of Important Decisions of the Week Affecting Electric Utilities

CALIFORNIA.

Great Western Power Company. The Railroad Commission has issued an order authorizing the Great Western Power Company of California to issue $5,000,000 10-year 6-per-cent convertible gold debentures. The proceeds are to be used as follows: For the purchase of the stock of the City Electric Company, $3,000,000, providing the City Electric Company invests this sum in additions and extensions to the properties belonging to it and the Great Western Power Company; $1,500,000 for construction of a second transmission line from the hydroelectric installation at Big Bend, Butte County, to Oakland; $250,000 for the construction of two cable lines across San Francisco Bay from Alameda County to San Francisco.

The United Railroads of San Francisco has filed with the Commission an application for an order confirming the issue by the United Railroads of coupons on 400 bonds of the Ferries & Cliff House Railway Company, remaining unpaid December 31, 1914. The bonds have a par value of $1,000.

Pacific Gas & Electric Company. On complaint of the city of San Jose and in connection with proceedings initiated upon its own motion the Commission established a schedule of rates and rules for electric service in the city of San Jose and adjacent territory. The company subsequently applied for a rehearing and the effective date of the original order was suspended pending a review of the additional evidence offered in support of such petition. The Commission ordered the following schedule of rates established for the city of San Jose and adjacent territory, including the towns of Los Gatos, Mountain View, Sunnyvale, Santa Clara, and Alviso and unincorporated territory, to become effective December 20, 1915: For domestic and commercial lighting, 7 cents per kilowatt-hour for first 20 kilowatt-hours; 4 cents per kilowatt-hour for next 330 kilowatt-hours; 3 cents per kilowatt-hour for amounts over 350 kilowatt-hours; minimum per meter per month, $1. Schedule also established for various forms of street lighting and certain changes made in rules governing agricultural and power service. The company was also directed to make all extensions and connections within the cities of San Jose, Los Gatos and Mountain View at its own expense, within thirty days from receipt of a written request for service, and also construct extensions, at its own expense, to six certain individuals named who have filed informal complaints with the Commission alleging the refusal of respondent to extend service.

It was also held that a fair allowance for overhead percentages on estimated reproduction cost of hydroelectric, steam and transmission construction is as follows: 1 year's construction period, 20 per cent; 2 years', 23.5 per cent; 3 years', 27 per cent; that an allowance of two months' operating expenses for working capital is a just and reasonable amount.

As regards the apportionment of investment in individual steam plants it was held that though on the face it would appear that such investment is more or less assignable to the immediate locality in which the plant is located, it is more proper to consider such plants as feeding the system as a whole, particularly as in times of low production at the hydroelectric production centers, the steam plants are called upon to develop considerable energy for consumption throughout the system as a whole.

MASSACHUSETTS.

The Massachusetts Gas and Electric Light Commission has recommended a bill to the Legislature which would permit a hydroelectric company to issue preferred stock to twice the amount of its common stock, and a bill ratifying the regulations established by the Commission for the installation of electric fixtures and wiring, which were printed in a recent number of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN.

MISSOURI.

Protection from Competition. Percy W. Markham has asked the Commission for a certificate of convenience and necessity permitting the furnishing of electric service in the city of Browning in accordance with franchises granted by the city and the county of Linn. The Browning Light & Plumbing Company, a utility furnishing acetylene lighting service in the city of Browning, was granted leave to intervene and the intervener contends that the applicant should not be permitted to establish electric service in competition with the lighting service from its acetylene gas plant. The Commission says: "It is the policy of the Commission where a utility has the occupancy of a field and is giving adequate service at reasonable rates to protect that utility from encroachment by a utility undertaking to furnish the same kind of service. However, in this case that rule cannot be said to apply. The applicant does not propose to install an acetylene plant in competition with the intervener, but proposes to install an electric plant. The intervener, as now engaged, only undertakes to furnish lighting service. The applicant proposes to furnish electric energy for light, heat and power. The testimony tends to show there would be some demand for power service from the applicant at Browning. Applicant further proposes to furnish continuous night and day service. The public at Browning should not be denied the many advantages afforded by electric service because intervener is already there engaged in furnishing lights with acetylene."

NEW YORK—First District.

Henry W. Hodge, a well known engineer of New York City, became a member of the Public Service Commission for the First District during the last week. On January 3, 1916, Commissioner R. C. Wood resigned, and Governor Whitman appointed Mr. Hodge in his place. Mr. Wood was appointed by former Governor Glynn in 1914 to a term that will expire February 1, 1919. Mr. Hodge was appointed to fill out the unexpired part of the term.

The Commission has prepared a summary of the accidents reported each month by the light and power companies of the First District, for the year 1915 as compared with the previous year. The total number of such accidents was 418 in 1915, an increase of five over the previous year. The number of serious injuries was 420 as against 413 in 1914, but the number killed was only one as compared with 13 in the previous year.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

Non-Short-Circuiting, Fiber-Covered Flashlight.

Manufacturers of flashlights for many years have been trying to get a fiber-covered flashlight that would not short-circuit when brought into contact with metal. The advantages of a non-short-circuiting flashlight to motorists, engineers, mechanics, and everybody else whose work brings them into contact with metal objects, are apparent.

The Interstate Electric Novelty Company, 29 Park Place, New York City, has just been awarded letters patent on a fiber-covered, non-short-circuiting flashlight which, it is said, cannot be short-circuited under any conditions, thus

New Fiber-Covered Flashlight.

saving the battery as well as the flashlight itself. These non-short-circuiting flashlights are now being made in eight different sizes, ranging from the "baby" tubular, illustrated herewith, which can easily be slipped into the pocket, to big, powerful miners' lights for hard usage.

Parker Expansion Bolts.

In electrical construction work the problem often presents itself of securing conduit, insulators or other circuit supports to masonry or concrete walls or ceilings. To accomplish this various types of expansion bolts and anchoring devices have been on the market for some time and these permit securing the results desired in a more or less satisfactory manner. One of the difficulties connected with the use of expansion shells, however, is that they are likely to turn while the bolt or lag screw is being drawn up.

To overcome this difficulty there has been placed on the market by the Parker Supply Company, 517 West Forty-fifth Street, New York City, an extensive line of expansion bolts and screw anchors. These are made in several types to be adapted to the use of a variety of forms of lag screws

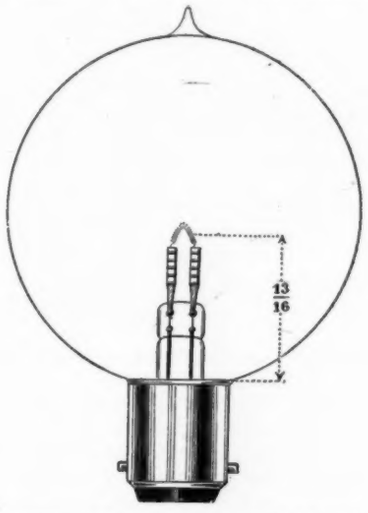
Parker Expansion Shield—Lag-Screw Type.

and also to be suitable for use with machine bolts. The characteristic feature of all of these Parker expansion devices is that each half of the expansion shield has a row of projections which are reversibly directed. This gives a sort of cam-like section to the shields, consequently when the bolt is drawn up to tighten the device and the shields attemp to turn, the projections thereon take a firm hold in the masonry or concrete hole and are wedged into the hole in the opposite direction so securely as to give an absolutely immovable grip. The two halves of the shield are held together by means of steel spring bands; these keep the parts in place until the bolt is to be expanded, but do not prevent the free and complete expansion of the shield while it is being expanded in the hole. All parts of the Parker bolts are made of a high quality of malleable iron, thus giving maximum strength and eliminating the liability to fracture. The machine-bolt type of expansion device is made for either single or double expansion and includes either one or two corresponding tapering wedges.

Jaeger Gas-Filled Lamps for Automobile Headlights.

For some years the H. J. Jaeger Company, of Hoboken, N. J., has been manufacturing gas-filled tungsten lamps for use in automobile headlights. These lamps have fully filled the requirements so satisfactorily that the company has recently found it necessary to build a large new factory at Weehawken, N. J., in order to supply the increased demand.

The company has also developed a new type of these lamps with filament of much more concentrated form than



Concentrated-Filament Gas-Filled Lamp.

has been heretofore available. This new construction meets the only objection heretofore raised against the nitrogen-filled lamp. A sectional view of the new lamp is shown in the accompanying illustration. With this new condensed form of filament a perfect focus can be obtained. These lamps all operate at an efficiency of one-half watt per candlepower and they are made in sizes ranging from 15 to 50 candlepower and voltages from 6 to 21 volts. On account of the very white color and extraordinary penetrating power of the light from these lamps, together with their very low energy consumption, they are particularly suitable for use in headlights of automobiles used in country touring or for driving on dark streets or roads.

Cochrane Metering Heater.

The combined open feed-water heater and hot-water meter, known as the "Cochrane metering heater," that was exhibited at the Panama-Pacific International Exposition

by the Harrison Safety Boiler Works, Seventeenth Street and Allegheny Avenue, Philadelphia, Pa., was awarded the gold medal. This apparatus is designed to heat boiler-feed water by means of exhaust steam from engines, pumps, etc., and simultaneously to meter the water and record the rate of flow, and to integrate the total flow in any elapsed period. This enables the engineer or plant owner to determine how many pounds of steam are being evaporated per pound of fuel burned under the boilers, and hence to compare the different fuels, different methods of firing, etc., that are employed, thus leading to the adoption of the most efficient. It also shows the effect upon boiler efficiency of cleaning soot and scale off heating surfaces, stopping up air leaks in furnace and settings, and other improvements in operation, and furnishes the means whereby the methods of obtaining high efficiency may be discovered, standardized and maintained. The equipment is designed on the most scientific principles and is built very ruggedly, thus combining high accuracy with low maintenance.

Black-Glazed Porcelain.

In response to a demand for a porcelain with a black glaze, there has been produced by the Cook Pottery Company, Trenton, N. J., a black glaze which permits the production of porcelain articles in exact imitation of those of hard rubber. The accompanying illustration shows a telephone mouthpiece made of this new material, in which

Mouthpiece Made of Black-Glazed Porcelain.

all but the threaded end is given the black glaze. This new material has, of course, all the well known insulating properties of porcelain, is impervious to moisture and will withstand extremes of heat, particularly high temperatures, very much better than hard rubber. It is very easily kept clean and is entirely non-absorbent. Another important advantage it possesses over hard rubber is that it can be produced at a much lower cost. It is believed this new material will find many uses in the electrical arts where its properties will be appreciated.

Curve-Recording and Analyzing Devices.

Among the recent developments of instruments for the solution of engineering problems are a curve-recording device and a curve-analyzing device, known as a "Polar Oscillograph Attachment" and a "Harmonic Analyzer," respectively. These devices are extremely useful to obtain a quick and accurate analysis of any periodic wave, such as the current or voltage wave of a motor, generator, or power system.

It has been customary for a long time to regard current and voltage values as vector quantities, and use these trigonometric relations to express the various phase relations. This, however, is only correct when the waves of current or voltage are pure sine values. When these waves are distorted, large errors may result by making these assumptions. So the only positive method of solving such problems is to obtain an actual analysis of the wave by means of an adequate analyzing device, such as the harmonic analyzer previously referred to.

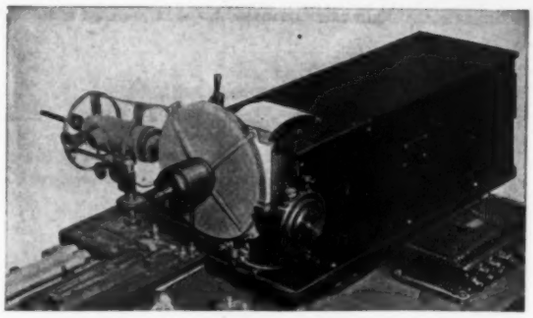


Fig. 1.—Polar Oscillograph Attachment.

Fig. 1 shows the polar oscillograph attachment used to obtain a polar oscillogram of the wave which is to be analyzed. This attachment can be used interchangeably with the regular rectangular film holder on the standard oscillograph. The oscillogram is made on a photographic film about ten inches in diameter, and is then printed on a sensitized piece of bristol board, from which a template is cut for use on the analyzer.

Fig. 2 shows the analyzer, which has been designed to give any one harmonic at a time, odd or even, as high as the fiftieth. The procedure for analyzing is extremely simple and entirely mechanical. Although the operation of the machine is based on the Fourier theorem, the actual procedure for analyzing can be performed by a person without any knowledge of the mathematics involved. Selecting the proper gears, turning the crank, and reading the planimeter are the only operations required.

This device can be applied to electrical problems of wave shapes of generators, and problems arising from the paralleling of generators, or cross currents in machines or transformer connections. The use of the analyzer, however, is

Fig. 2.—Harmonic Analyzer.

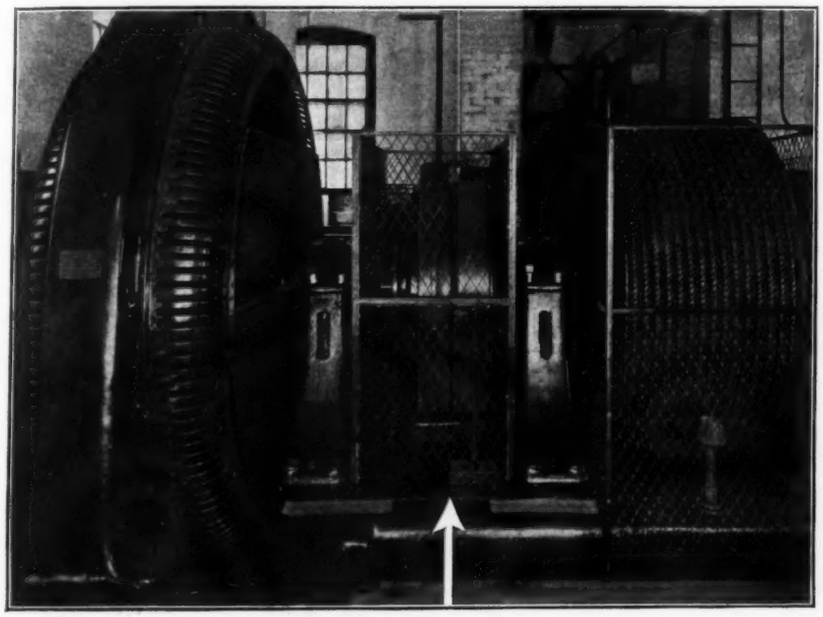
not limited to electrical problems. Any periodic wave, such as sound waves, waves of magnetic flux, torque curves of gas engines, can be analyzed and the related waves derived by simple mathematical transformation.

These new devices will prove to be valuable additions to any standard oscillograph equipment. The case and the metal parts of the analyzer are nicely finished, so that the instrument has a most attractive appearance and fits in very well with other instruments in a well-equipped laboratory. They are manufactured by the Westinghouse Electric & Manufacturing Company, and received a bronze medal at the Panama-Pacific International Exposition.

AN INTERESTING INSTALLATION OF A LARGE MAGNETIC CLUTCH-BRAKE.

By C. B. Ferguson.

In the mill room of the Boston Woven Hose & Rubber Company, the rubber mills are driven in groups from a single shaft by a 650-horsepower synchronous motor. The



Magnetic Clutch-Brake on Synchronous-Motor Mill Drive.

synchronous motor was used to raise the power-factor of the supply system. Two problems were presented; one, the safety-stop feature of every rubber mill; the other, the starting of the synchronous motor.

The safety-stop feature is an important one in the rubber-mill room of today. The easy means of throwing off the driving power and applying a powerful brake has saved many hands, arms and even lives. This feature is provided by the Cutler-Hammer clutch-brake installed which is indicated by the arrow in the illustration above.

The starting of the synchronous motor is another problem. With this type of motor means of easy and gradual acceleration of a considerable load must be provided to prevent the load from being thrown on the motor too suddenly and thus pulling the motor out of step. Since the station supplying power for this synchronous motor was already loaded up to its capacity it was important to provide means for properly accelerating the motor. This means consisted of the magnetic clutch-brake referred to above.

The equipment consists of a synchrouous motor mounted on a common subbase with a rope sheave, the magnetic clutch-brake furnishing the connection between the motor and the sheave. The motor is rated at 650 horsepower, runs at 240 revolutions per minute and under normal conditions carries practically full load when the mill line is operating. Safety switches are installed in the mill room and a slack-cable switch in the motor room to stop the motor and lineshaft in case of the driving rope breaking.

The chief points of this installation are, therefore, as follows: safety in the mill room provided by safety switches which stop the mills in case of accident; gradual acceleration of the synchronous motor by means of an automatic rheostat and clutch-brake; prevention of accidents because motor can not be started by closing one of the safety switches—station operator must do it by closing panel switch; slack-cable switch in motor room automatically disengages clutch and causes brake to be applied in case the driving ropes break; stopping push-button provided on control panel for ordinary stops when clutch is simply released but brakes not applied, thus saving unnecessary wear.

With reference to details of the clutch-brake or clutch-brake accelerator, as sometimes called, it should be noted that the clutch portion consists of a solid circular steel casting, mounted on the driving or motor end of the shaft. This member of the clutch carries imbedded in its periphery a single cylindrical magnetizing coil, the terminals of which are brought out to an ordinary pair of slip rings. Mounted concentrically with the coil and the outer periphery, is supplied an adjustable friction ring so that the metal faces of the driving and driven member do not come directly in contact with each other. This also serves the purpose of providing a permanent air-gap in the magnetic circuit. The other member of the clutch, keyed to the driven or rope-pulley side of the shaft, consists of a circular steel armature secured to the hub by means of a flat circular spring plate, so that when the magnetizing coil is energized, this circular armature is drawn towards the driving member of the clutch, the motion along the shaft being accomplished by a slight dishing of the spring plate upon which it is mounted. It will be noted from the description just given of the clutch portion of this equipment, that this particular form of clutch possesses the advantage of instant disconnection in case of interruption of the magnetizing current and does not require a portion of a revolution for its disengagement. Another feature easily understood from the above description is that with this form of clutch there is no tendency for it to either release itself or to lock itself due to the mechanical forces exerted as it comes up to speed and while it is running at full speed.

Secured to the hub of the driven member is an ordinary brake pulley, over which there is carried a band brake of the locking type, automatically released by a solenoid mounted on a separate stand in proper relation to the brake beam. The clutch itself is 54 inches in diameter.

Throughout the mill room numerous safety switches are installed and these are arranged in series electrically so that the clutch will be disengaged and the brake simultaneously applied if a safety bar, one of which is provided for each mill, is tripped. In the motor room there is provided a single push-button for engaging the clutch and the clutch is energized by means of an automatic rheostat in such a way as to make it pick up the load gradually and at the same rate of speed for each start. One novel feature of the electric control system is that if the clutch is

disengaged by the operation of any one of the safety stations located throughout the mill, as stated above, the brake is simultaneously applied. If, however, the clutch is disengaged by means of a stopping button on the motor control panel, the brake is not applied but the load is allowed to coast to rest. Consequently, the quick stop is obtained only in case of an accident. Another feature of the control system is that when the safety stations have once been tripped, they can be reset immediately, but power can not be put back on the mill line until the single starting button located on the motor control panel has been operated. A slack-cable switch is also provided so that in case of breakage of the rope drive the clutch is automatically disengaged and the brake applied.

Checking over the conditions noted in the opening paragraph it will be seen that all have been provided for, and a half year's operation since installation has been successful.

Leader Air-Supply Outfit.

Autoists like to be able to inflate their tires while buying gasoline or accessories, and the station that is best equipped and most convenient will get their business.

An economical portable air-supply outfit, which is shown in the illustration, is manufactured by the Leader Iron Works, of Decatur, Ill. The complete outfit consists of a motor, air compressor, automatic controller, air tank and fixtures.

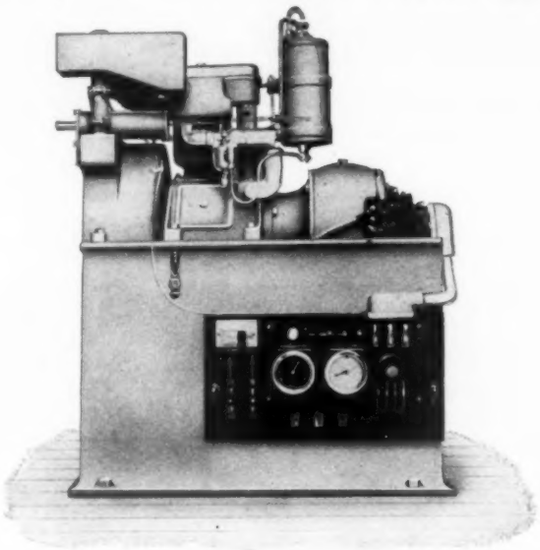
The motor is of the Westinghouse one-horsepower repulsion-induction type, having a high starting torque and low starting current. Frequent starting and stopping of the motor is eliminated by the use of a 14 by 36-inch welded air tank, which is of sufficient capacity to inflate several tires. The air pressure in the tank is maintained at a value between 110 and 150 pounds by an automatic controller on the motor. Thus air at the desired pressure is always available.

The compressor has a 2.5 by 3-inch cylinder, which is air cooled and provided with a hand unloader. Fittings for connection are furnished, as well as five-inch pressure gauge, pop valve, drain cock and other convenient accessories.

Motor-Driven Tire-Inflating Outfit.

Matthews Self-Contained Automatic Lighting Plant.

During its 20 years' experience in building the highest types of cruising motor boats, the Matthews Boat Company, Port Clinton, O., found the need for a reliable and sturdy lighting equipment suitable for the severe service aboard ship. A large number of lighting plants had been tried out for this purpose without entire success. Consequently the company's engineers



Matthews 50-Light, Full-Automatic Lighting Plant.

set about to develop a plant that would meet all of the requirements. This was done and the resulting equipment proved so satisfactory that it was decided to build it also in modified form to adapt it for country lighting and similar isolated-plant service.

These plants are built in several types, of which the one illustrated herewith is self-contained with the exception of the storage battery and is completely automatic. In the design of this type of plant it was determined to produce an equipment suitable for the farming district or rural community that would eliminate the need for electrical or mechanical knowledge, in other words, one that would enable the housewife or maid to turn on the current at any lamp or for any flatiron, cream separator, washing machine or other appliance without previously starting the engine, adjusting the apparatus and watching the storage battery. This ideal was achieved so successfully that this automatic plant provides as reliable service instantly available at all times as the average central station in the small town.

As shown in the illustration, the plant is very compactly and ruggedly built. The whole outfit is mounted on a substantial iron base about 3 feet by 2 feet in area. Driving power is obtained from a Matthews four-cycle gasoline engine that is designed for efficient, reliable and quiet operation; this engine costs nearly three times as much to build as the selling price of the types of engine usually supplied with country lighting plants. The generator is a one-kilowatt, 32-volt, General Electric multipolar type. Separately mounted is a 16-cell, 80-ampere-hour Willard storage battery of the inclosed-jar type. An automatic switchboard is mounted in the base of the generating set, which is rated as a 50-light set, assuming 20-watt tungsten lamps as the lamps to be used.

The principle of operation of the plant is both simple and ingenious. The storage battery is depended on chiefly as a regulator of voltage and as a source of current for electrically starting the engine; it also serves as current source for small currents, but only in emergency is it discharged very completely. As soon as about 15 per cent of the battery capacity has

been discharged, the engine is automatically started through the generator acting as a motor fed from the battery. When the engine has attained full speed the generator begins charging the battery as well as supplying any load there may be on the system. When the battery is again fully charged and there is no longer load on the plant, or only a very small load, the engine is automatically shut down. From this it will be seen that the battery is always kept at or near to full charge, a condition favorable to long life and economical operation. The generator carries all loads directly, except when the small load of only a few lights is on. Voltage regulation and all features of the electrical control are entirely automatic, being carefully adjusted once for all times. The electrical part of the equipment, like the rest of the plant, is of sturdy design and not more likely to get out of order than the electric ignition, starting and lighting equipment of the modern automobile.

The same type of plant is also made of double capacity, that is two kilowatts or 100 20-watt lights. The Matthews Boat Company also makes hand-controlled plants of 50 and 100 lights rated capacity and several special marine lighting plants, both of the full automatic and hand-control types.

The Goheen Pole-Hole Digger.

In digging holes for the poles of any overhead electric lines much time is lost and useless effort expended in changing from cutting to shoveling or dirt-lifting tools or spoons. Various special digging outfits have been devised, but these are complicated and not always convenient. To overcome the disadvantages of former equipments, the Triple Tool Company, Jacksonville, Ill., has placed on the market a simple and reliable patented combination tool, known as the Goheen pole-hole digger. By easy adjustment of the blade the tool is readily converted from a straight cutting tool or spade, to a shovel or large spoon. It serves also for ditching or tunneling work, as well as hole digging.

The tool consists in the main of a straight wooden handle with ferrule, one leaf spring and a steel blade. Near the upper end of the blade is attached a case-hardened eye so constructed that it has three flat surfaces for the pressure of the spring which rests in the ferrule and bears upon this eye, thus holding the blade in various positions a few of which are illustrated. Close to the upper end of the spring the ferrule is pierced by a set-screw which is used in giving the desired tension. From this it is evident that the tool is very simple.

Goheen Pole-Hole Digger With Rectangular Scoop Blade in Three Different Adjustments of Blade Position.

Single-Phase Motor Development.

"The demand on the part of central-station operators in the past few years," says R. J. Russell, secretary of the Century Electric Company, St. Louis, Mo., "for a single-phase motor that would require less starting current than the split-phase motor, and thus make it possible to maintain good voltage regulation on secondary circuits without the installation of an abnormal amount of copper, prompted the company to commence some years ago to develop smaller sizes of Century repulsion-induction motors than hitherto manufactured.

"The beginning of the year 1915 witnessed the first real introduction of these motors to the market, and the commencement of their application in fair quantities to various classes of machinery, with the result that they are now being used in sizes of one-sixth, one-eighth and one-tenth horsepower as regular equipment by a large number of manufacturers of such apparatus as is called upon to start frequently; viz., carbonators, beer pumps, coffee-mills, house pumps, etc.

"The real advantage in their use which is found in the small Century motor is the fact that the starting torque is more than three times full-load torque, and starting current less than three times full-load current, making it possible to start so quickly the majority of the apparatus generally driven by such small motors that a fuse of such size as will properly protect the motor while running and carrying its full load is of ample size to carry the starting current. The use of ring oil bearings is another feature which is appreciated by practically all who have anything to do with such small motors.

"The radial type of commutator is used, brushes bearing on this commutator only during the period of starting. When the motor is accelerated to a speed closely approaching the full-load speed of the motor, the governor acts, taking the tension off the brushes, and short-circuiting the commutator after the manner characteristic of the larger Century motors."

INDUSTRY ACTIVITIES

Import Sales Company, importer and manufacturer, announces its removal, on February 1, to larger quarters at 318-324 East Thirty-second Street, New York City.

Julius Andrae & Sons Company.—The annual conference of the sales organization of Julius Andrae & Sons Company was held in Milwaukee, January 7. Following a busy conference day a banquet was held at the Hotel Pfister.

General Lead Batteries Company, Chapel Street and Lister Avenue, Newark, N. J., has issued bulletin No. 15 describing Isolite storage batteries in glass jars. These are particularly suited for farm lighting and other small isolated plants, fire-alarm and burglar-alarm systems, signaling work, etc.

Diehl Manufacturing Company, Elizabeth, N. J., has moved its Chicago office to 1641 Edison Building, 72 West Adams Street. The Chicago storeroom and repair department has been moved to 730-734 West Monroe Street. These changes provide better facilities and permit taking care of the increased business of the Chicago office.

Samson Cordage Works, Boston, Mass., has sent to its many customers and friends a neat desk calendar which calls attention to its extended line of braided cord and cotton twine. Samson spot sash cord is briefly referred to; this and other Samson cords are much used for mounting street lamps and interior lamps that are to be lowered.

The Electro-Dynamic Company, maker of the well known Interpole motors, is to increase its present plant at Bayonne, N. J., by an addition which will be approximately 100 feet square. The contract has already been placed with the John W. Ferguson Company, of New York City and Paterson, N. J. The addition will be built on regular mill-construction lines with brick walls and a felt and slag roof.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued through its Automobile Department circular No. 1532-B dealing with 1916 starting, lighting and ignition equipment. The different details entering into the electrical equipment of an automobile are explained in detail; diagrams are given on the mountngs and views are shown of the equipment mounted on several different types of automobile engine.

General Radio Company, 11 Windsor Street, Cambridge, Mass., has issued catalog A dealing with Radio laboratory apparatus. Among the instruments and equipment particularly illustrated and described is the variable air condenser, a universal wave meter, sensitive high-frequency meter, standard and variable inductances, oil and air condensers, spark indicator, etc.

The Estate Stove Company, Hamilton, O., has issued catalog No. 10 on "Estate Electrics." This describes the line of electric stoves and ranges which has recently been placed on the market by the company. Several types are illustrated and their construction and operation explained in detail. The Estate company has been making stoves since 1845 and, although the electric line is new, it has been developed as the result of ripened experience in stove building.

The American Rotary Valve Company, Anderson, Ind., announces that it had discontinued the manufacture of electric motors, press drives and its present line of vacuum cleaners. The company will fill orders at present in hand and continue to provide repair service on all of these lines. This modification of the company's line is the result of unexpectedly rapid development of the business on the "Arvac" universal joint, to which the company will now devote its entire effort. The change does not involve any modification in the company's ownership or management.

Prizes for Articles on Mechanical Soot Blowers.—The Diamond Power Specialty Company, Detroit, Mich., has offered $100 in four prizes for the best articles submitted by operating and consulting engineers on the use of mechanical soot blowers in improving the economy and efficiency of power plants. Particulars regarding this contest are obtained from the company. The articles must be between 1,000 and 5,000 words in length and must be submitted before March 1.

The Doehler Die Casting Company, Brooklyn, N. Y., and Toledo, O., has placed contracts for its new Toledo factory buildings to contain 70,000 square feet of floor space, consisting of foundry, machine shops and offices. With these buildings which are to be ready for occupancy May 1, completed, this company will be in a better position to give its western patrons prompt and efficient service, which they have heretofore received from the Brooklyn plant.

The National Conduit & Cable Company, 41 Park Row, New York City, is continuing the monthly publication of its "Copper Gossip," which for many years has thrown a great deal of light on the status of the copper market both in New York and London. Pertinent comments are made on the general business outlook, which is found to be most favorable at present. Notes on copper mining activities and developments and on the exports and imports of copper, also on copper stocks, always prove of interest.

The Globe Stove & Range Company, Kokomo, Ind., has discontinued the electric stove sales office which it has maintained for some time in the Edison Building, Chicago, Ill. The entire organization, comprising both the manufacturing and sales branches of the electrical department, is now united at the home office in Kokomo. P. L. Miles, sales manager, and J. H. Risser, manager of the central-station department, have moved their headquarters to Kokomo. It is believed this change will facilitate the business of the electrical department.

The Diamond State Fibre Company through its Chicago manager, Theodore Herkert, has just secured from the Beckley-Ralston Company, of Chicago, dealers in automobile supplies, a contract for a half million speedometer gears. This is said to be one of the largest orders of its kind ever placed. The Chicago office of the Diamond State Fibre Company has exceptional facilities for turning out fiber specialties. It possesses a well equipped machine shop and claims to carry the largest stock of fiber in the West. At the present time the Chicago office has a stock of over one hundred thousand pounds of fiber. The company states that business is exceptionally good.

Spec Engineering Company, Pontiac, Mich., is calling to the attention of the owners of steam-boiler plants the manner in which its Craig system of smoke prevention eliminates the heavy smoke output at each firing, minimizes the deposit of soot on the boiler and results in decided fuel economy and improved boiler efficiency. The system is entirely automatic in action and introduces the proper mixture of steam and air to completely burn the gases distilled from the fresh coal added. The company has available the results of numerous tests to show the

improved economy resulting from use of the Craig system, which is installed on a 30-days' trial proposition backed by a strong guarantee. The system has been approved generally by city smoke-inspection departments.

The Richardson-Phenix Company, lubrication engineer and manufacturer, Milwaukee, Wis., has recently opened a branch office at 141 Milk Street, Boston, Mass., in order to take care of its increasing business in New England. This office will be in charge of Charles E. Blake, who has had many years' experience with the company in the design and installation of power-plant lubricating systems. The Richardson-Phenix Company also announces the removal of its New York City office to 30 East Forty-second Street; E. M. May, manager of this office, now has associated with him J. J. May, who will devote his energies to the Richardson-Phenix NoKut Valve Department.

Central Electric Holds Sales Conference.—The first week in January was devoted by the Central Electric Company, of Chicago, to a general sales conference, the first one which this company has held for a number of years. Twenty-five outside salesmen devoted the entire time to a study of the company's specialties, many of which through consistent advertising in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN and other papers have acquired a national reputation. Among them are the well-known Okonite products, Alexalite indirect lighting units, Ralco indestructible plugs and receptacles, Columbia incandescent lamps, D. & W. fuses, Deltabeston wire.

Superior Electric Manufacturing Company, 2414 University Avenue S. E., Minneapolis, Minn., has issued bulletins Nos. 1 and 2 dealing with types A and B steel cabinets. These cabinets are made in a large range of sizes. Very complete data are given of the various sizes, also brief descriptions of general features. The type B cabinets listed in bulletin No. 2 are designed particularly for single-pole, double-pole and triple-pole service switches. Other tables give approximate dimensions of porcelain cutout blocks with and without switches in the branches and the necessary widths and depths of cabinets for containing the same.

Information Desired Regarding Effect of Vibration of Structures.—Recognizing that practically everyone is certain that higher speed, better work, and greater human efficiency are possible in a stable as compared with a vibrating building, but that exact data proving this fact are difficult to obtain, the Aberthaw Construction Company of Boston, is undertaking an exhaustive investigation in the effort to bring together conclusive evidence. They will greatly appreciate any suggestions or reports of experience that our readers may be able to send to them. These may have to do with any aspect of the case that will assist in the collection of facts or the reaching of conclusions.

The Bell Lumber Company, Minneapolis, Minn., has been awarded the cedar on all the tribal lands on the Odanah Indian Reservation on its bid to the Indian Department. The company had already secured all of the other timber on this reservation three years ago, and as this tribal timber covers a number of years' operation, taken together with its previous holdings on the reservation and at other points, it insures the company timber for white cedar pole operations for at least ten to twelve years to come. The company has started to operate camps on the reservation and at other points producing poles to supply its next spring and summer trade.

Ivanhoe-Regent Works of General Electric Company, Cleveland, O., has issued catalog No. 108, which is a very attractively illustrated book dealing with Regent semi-indirect bowls for decorative and commercial lighting. A very large number of designs of these bowls made in Veluria, Druid and Sudan glass are illustrated; dimension diagrams and full data for each type are given. Colored views are shown to give an idea of the proper tint and a better conception of the etching of these bowls. Much valuable information is also included in the catalog regarding the methods of suspension of semi-indirect bowls and the best spacing and mounting height, etc., thereof. Other illumination data are also included.

The Bailey Meter Company has been incorporated under the laws of Massachusetts and has opened headquarters at 141 Milk Street, Boston. The company will manufacture and sell a very complete line of recording meters and instruments for power plants and other similar uses. These instruments have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company of Boston. At the head of the company is E. G. Bailey, who will devote his entire time to its interests. The Bailey meters are adapted to the accurate measurements of steam, water, air and gases under all conditions of pressure, temperature and capacity. The Bailey Meter Company is prepared to take up all problems related to the flow of fluids.

The Electric Storage Battery Company, Philadelphia, Pa., manufacturers of the "Exide" battery, the "Chloride Accumulator" and "Tudor Accumulator" and the "Ironclad-Exide" battery, announces a change in the handling of its Pacific Coast business to take effect January 1, 1916. Due to changes in the organization of Pierson, Roeding & Company, who have acted as the Electric Storage Battery Company's sales agents on the Coast since 1910, the Battery Company will hereafter conduct its business on the Coast through George R. Murphy, soliciting agent, with offices in the Rialto Building, 118 New Montgomery Street, San Francisco, Cal. The Exide Battery Depot, which was opened in San Francisco a number of years ago and where a large amount of stock is carried, will give Mr. Murphy a base of supplies that will insure prompt shipments of batteries and parts. The Electric Storage Battery Company's business on the Coast has been very satisfactory in batteries for use in electric commercial and pleasure vehicles, mine locomotives, industrial trucks, for automobile starting and lighting service and in other fields of storage battery application.

New Western Electric Year Book.—The second edition of the Western Electric Company's Year Book is out. It is known as the "Electrical Supply Year Book for 1916" and is similar to its predecessor which, it will be remembered, caused such a favorable impression in the electrical supply business when it made its appearance last year. The current book contains the practice of a simple series of list prices upon which a basic discount applies, such a discount indicating to the holder of the catalog his approximate price for all of the articles listed. This method of pricing was received enthusiastically by the trade. The 1916 book has a stiff, light blue, artistically designed cover and differs from the 1915 issue only in that its listings are more complete and comprehensive, the number of pages being 1504 as compared with 1296 last year. Nearly 50,000 copies were printed. One feature of the present book is a section in which are listed all the sales helps that the company furnishes its agent gratuitously; herein are illustrated all these helps in reduced size, together with reference numbers by which any or all may be ordered; electrotypes, window displays, booklets and lantern slides are among the helps listed. The continuance of the year book proves the Western Electric Company's theory that a catalog issued yearly is better all around than the old catalog that made its appearance every three years, also that a simple system of list prices is far better from every angle than the old jumbled system of discounts that nobody understood. The new catalog deserves a place on every electrical supply man's shelf; its completion again establishes the Western Electric Company among the most progressive jobbing houses and manufacturers of the country.

CURRENT ELECTRICAL NEWS

ATLANTIC STATES.

PRATTSBURG, N. Y.—Plans are being considered for electric lights and for an electric railway to Kanona and possibly to Stanley or Branchport. John Kimmel of Wayland has an option on the Kanona and Prattsburg railroad and the Town Board at special meeting granted him a franchise to operate such a railroad and furnish light and power for this village.

WAPPINGERS FALLS, N. Y.—Deering, Milliken & Company, who own the local electric railway system, are planning to make an extension to New Hamburgh at a cost of about $100,000. An electric locomotive and other equipment will be purchased.

PHILADELPHIA, PA.—Hafleigh & Company will erect a brick, concrete and steel power house. W. E. S. Dyer, Philadelphia, is the architect.

DELAWARE WATER GAP, PA.—J. P. Cope, Atlantic City, N. J., will erect a $200,000 hotel here. Plans are in progress by J. H. Vaughn, Atlantic City, N. J., architect.

PHILADELPHIA, PA.—Bids will soon be advertised for a power house at the Institution for the Feeble-Minded at Byberry, Pa. Address Dr. Krusen.

LE RAYSVILLE, PA.—An electric lighting system for the town and community, including the streets, is to be installed in the near future. H. G. Newell, corresponding secretary of the Community Welfare Association, will receive communications and proposals.

WASHINGTON, D. C.—The capacity of the Bennings steam power plant of The Potomac Electric Power Company, Washington, D. C., is to be increased by the installation of an additional 15,000 kilowatt generator. The power-plant building will be enlarged by the construction of necessary extensions to accommodate the new machinery, and a contract for the engineering and construction work has been closed with the J. G. White Engineering Corporation, of New York.

CLEARWATER, FLA.—The Tampa Clearwater & Island City Railroad Company has been incorporated with a capital of $100,000 by G. R. Smoyer, and others to build an electric railway between Clearwater and Clearwater Key, a distance of three miles.

JACKSONVILLE, FLA.—The city will enlarge its electric plant.

NORTH CENTRAL STATES.

CINCINNATI, O.—Boilers and other power and electrical equipment will be required in the construction of the proposed new home of the Business Men's Club, which will cost about $600,000. The site for the building and other details will be determined upon at an early date by the building committee.

ZANESVILLE, O.—The Public Utilities Commission has authorized the Southeastern Ohio Railway Company to issue $800,000 common stock and use the proceeds for buying the electric line running between Zanesville and Cooksville, now owned by the Southeastern Ohio Railway, Light & Power Company. The sum of $758,000 is to be paid for the property and $42,000 for improvements, according to the commission's order. The company plans to extend the line to New Lexington.

SPRINGFIELD, O.—The power capacity of the Springfield Light, Heat & Power Company is to be increased from 600 to 1,300 horsepower, Manager Wears Parsons announcing that work will begin in March. Increased facilities will be provided in every department. L.

ZANESVILLE, O.—The Southeastern Ohio Railway Company, organized to take over the plant and business of the Southeastern Ohio Railway, Light & Power Company, is considering various extensions, including an additional power plant. The company operates a line of electric railway and furnishes current for various purposes to towns along its line.

SALEM, O.—The Salem Lighting Company, with a capital stock of $15,000, will construct a power and distributing plant, according to plans recently announced by its organizers.

DRESDEN, O.—The Dresden Electric Light Company, incorporated with a capital stock of $10,000, is preparing to equip a plant.

DAYTON, O.—At a meeting of the board of directors of the Dayton Power & Light Company, it was decided to spend $1,000,000 in the construction of a power plant at Miller's Ford, south of the city. The new power house will have a maximum capacity of 165,000 horsepower. Increased service will be furnished in Dayton, Xenia, Piqua, and other neighboring cities.

SOUTH BEND, IND.—Mayor F. W. Keller has appointed a committee to investigate the plausibility of a municipal lighting plant.

COLUMBIA CITY, IND.—Engineer Charles Brossman, of Indianapolis, has prepared plans and specifications for a new unit to be installed in the local power plant. Address city clerk.

INDIANAPOLIS, IND.—The Public Service Commission has approved the petition of the Merchants' Heat & Light Company to issue $70,000 in common stock and $280,000 in bonds. The company will use the money to pay for improvements. Address Eleazor Darrow, general manager, 33 South Meridian Street.

BYRON, ILL.—The Byron Electric Light & Power Company has been incorporated with a capital stock of $10,000 to furnish electric light and power. William H. Vanston, Thomas M. Henck and others are the incorporators.

AURORA, ILL.—The city council is considering an amendment to the 1916 appropriation ordinance providing an appropriation of $100,000 for pumping and power-plant improvements.

MACOMB, ILL.—The council has taken favorable action towards installing a number of cluster lights. Address George Allison.

WAUKEGAN, ILL.—The Wilder Tanning Company has petitioned the council to place additional electric lights. Address Mayor Pearce.

GAYLORD, MICH.—The plant of the Vanderbilt Electric Light & Power Company has been sold to Fred King, of this place. The new plant will probably be equipped with crude-oil engines and the intention is to make it a duplicate plant in order that a more efficient service can be rendered the village. Mr. King will make extensive improvements.

ADRIAN, MICH.—George F. Avis, Oren Howes, F. D. Avis and C. J. Avis, all of Hudson, Mich., announce the formation of the Southern Michigan Light & Power Company, which is to absorb the Hudson Light & Power Company and the Morenci & Fayette Light Company. The company will extend its power transmission to towns in Southern Michigan and Northern Ohio.

CASCADE, MICH.—The Cascade Electric Company, owners of water power rights at Cascade, about 1,200 horsepower, and at Alaska, near Grand Rapids, 400 horsepower, will develop this power during the coming summer.

MAUSTON, WIS.—The Railroad Commission has granted the Farmers Inter-State Telephone Company its application for a physical connection with the Mauston Electric Service Company to the village of Lyndon. The Mauston Company is ordered to construct a metal toll line and to bear the expense of this construction.

MERTON, WIS.—An electric line will be built from Rewaukee to Merton via Lake Five, Washington County, by the Milwaukee Electric Railway & Light Company. Address James D. Mortimer, Syracuse and Second Streets, Milwaukee, Wis.

MARSHALL, WIS.—The Marshall Electric Light & Power Company has been incorporated with a capital of $10,000 by R. J. Buss, J. D. Meyers and others.

HILLSBORO, WIS.—The Hillsboro & Northeastern Railway Company has increased its capital stock from $100,000 to $250,000 and will extend its electric line from Hillsboro to Richland Center.

VIRGINIA, MINN.—Plans are being considered for extending the electric lighting system to Parkville.

HAZLETON, IOWA.—H. C. Clar, manager of the Fayette Country Utilities Company of Oelwein is making arrangements for the legal publication of the notice in regard to the company extending its electric line from Oelwein to Hazleton to furnish light for that town.

ALBION, IOWA.—February 1 an election is to be held to vote on a proposal to grant to the Iowa Railway & Light Company of Marshalltown,

and Cedar Rapids a 25-year franchise for electric light and power.

WATERLOO, IOWA.—The Citizens' Gas & Electric Company has submitted to City Council the proposition of asking for new 25-year franchise nullifying the present franchise, which expires in 10 years. The company proposes to erect a large electric power station costing $800,000. Address Austin Burt, manager.

VINTON, IOWA.—The town plans installing about April 1 two 300-kilovoltampere steam turbogenerators, also new switchboards, and new pumps for water works, to be operated in connection with lighting plant. Address W. E. Kingman, superintendent.

MANNING, IOWA.—The Manning Electric Lighting Company plans to install in March or April one 150-kilowatt, 250-volt, direct-current generator, switchboard equipment, etc. Address A. J. Rusenberg.

CUMBERLAND, IOWA.—The installation of a municipal electric light plant is under construction. Address city clerk.

LOCKBRIDGE, IOWA.—The people of this town have voted on the proposition granting an electric franchise to R. M. Burtis and associates. The current is to come from the plant of the Fairfield Public Service Company at Oakland Mills.

WELLSBURG, IOWA. — The Iowa Falls Electric Company has filed its petition with the Board of Railroad Commissioners of the State of Iowa for a franchise for the construction of a transmission line for the conducting and transmitting of electricity to be used for lighting, power and heating purposes from the town of Wellsburg, Iowa, to the town of Morrison.

CEDAR RAPIDS, IOWA. — The Iowa Falls Electric Company has increased its capital from $100,000 to $300,000. This company has purchased the Dows, Iowa, electric light plant.

MARSHALLTOWN, IOWA.—The Iowa Railway & Light Company has purchased the power plant at Zearing, owned by Belden & Son, and plans to connect the plant with a high-tension line to be built to Ames, Iowa, next summer.

THORNTON, IOWA.—The Thornton Light & Power Company has been incorporated with a capital of $10,000 by H. O. Chase and others.

WARRENSBURG, MO.—The Council favors the establishment of a municipal lighting system. Address town clerk.

DEARBORN, MO.—The proposition of granting a franchise for electric light plant has been carried. Address mayor.

ELKHART, KANS.—The Council is planning to establish a municipal lighting system. Address Edgar Roberts, city attorney.

VALLEY, NEB. — The municipal electric plant has been leased by the Central Station Engineering Company, City National Bank Building, Omaha. Improvements will be a new generator and boiler and new street lighting system, consisting of 42 series tungsten lamps.

CORTLAND, NEB.—A. J. Goodban is contemplating the installation of an electric lighting plant.

PIERRE, S. D.—A power and light company to supply electric light and power to portions of Douglas, Charles Mix, Hutchinson and Bon Homme counties is covered in the articles of incorporation filed for the South Dakota Light & Power Company, with headquarters at Armour. It is capitalized at $1,250,000 and the incorporators are E. P. Wanzer, John T. Cameron, Percy H. Munson of Armour.

MARION, S. D.—A 20-year franchise was granted to John Heib and assignees to install an electric light plant in this city.

NEWELL, S. D.—The Board of Trustees are negotiating for the installation of an electric lighting plant.

BISMARCK, N. D.—The Woodruff Electric Light & Power Company has been incorporated with a capital of $25,000 by W. G. Woodruff and others.

RYDER, N. D.—A franchise has been granted to E. E. Fredeen, for the installation of electric lighting plant.

SOUTH CENTRAL STATES.

LOUISVILLE, KY.—The Louisville Home Telephone Company has announced its plans to construct a new branch exchange to serve the Highlands of Louisville. The improvement, which will be an attractive building to occupy a site in a high class residence district, will cost. together with the switchboards, conduit construction, etc., between $100,000 and $125,000. It will be equipped to take care of 2,500 lines at the outset, although the ultimate capacity will be 7,500 wires. This improvement will take care of one of the important residence districts of the city, which is growing rapidly. Conduit construction was completed last summer. G.

LOUISVILLE, KY.—The Sandy Valley Light & Power Company, L. L. Stone, manager, will build a power plant at this place. G.

MORGANFIELD, KY.—S. B. Anderson of Memphis, Tenn., and G. L. Drury of this city, propose, if right of way is granted by the court to construct and maintain an electric standard-gauge, trunk railroad between Morganfield and Uniontown, to be in operation within 12 months.

SHARON, TENN.—The citizens have voted $25,000 in bonds for an electric light and waterworks system. Address mayor.

ASHDOWN, ARK. — R. M. Warmack has purchased the Ashdown Light & Power Company, valued at $15,000. Improvements will be made.

NEWPORT, ARK.—The Newport Water, Light and Power Company will erect a three-story building, to be used for offices and demonstration rooms.

FRANCIS, OKLA.—The Francis Gas & Electric Company has been incorporated with a capital of $10,000 by James Mascho of Ada, Gus Howerton of Oklahoma City and others.

TEMPLE, TEX.—The City Water Commissioners voted to adopt electricity to replace steam for motive power at municipal waterworks pumping station. A new pump will be purchased. Address mayor.

CLAUDE, TEX.—The city is prepared to grant a franchise for electric lighting plant and waterworks. Address Board of City Development, A. Whaley, secretary Amarillo, Tex.

BEEVILLE, TEX.—The Texas Southern Electric Company plans to make improvements to include a 125-kilowatt engine and generator, etc. Address F. C. Greer, manager.

COLUMBUS, TEX.—Sam Hamburger and Leo Steiner have purchased the Columbus light plant, which will be remodeled. Service will be extended to Glidden and other nearby towns and an ice plant and cold storage will be added.

BEEVILLE, TEX.—The City Commission has under consideration the proposition of constructing a municipal electric light plant here. D.

BRYAN, TEX.—The City Council has ordered an extension of the municipal lighting system. D.

WESTERN STATES.

BILLINGS, MONT.—The proposition of replacing with a more modern lighting system the one now in use is being considered by the City Council.

SIMMS, MONT.—According to authentic reports, the Montana Power Company, maintaining head offices in Great Falls, will construct transmission lines from their main power lines at Sun River and distribute current to this and other cities in the Sun River Valley. It is understood the proposed improvements will be made as soon as weather conditions permit. O.

STERLING, COLO.—J. F. Symes and L. P. Hammond of Denver and H. L. Titus have purchased control of the Sterling Consolidated Electric Company. Improvements will be made.

SANTA FE, N. M.—F. C. Baker is preparing to install an electric plant at Ft. Sumner.

SOLOMONVILLE, ARIZ.—The City Council has appointed a committee to investigate the matter of a municipal lighting system.

NOGALES, ARIZ.—The International Gas Company is building an electric power transmission line from its central station here to Duquesne for the purpose of furnishing power to the Duquesne Mining & Reduction Company. It will also make other extensions of its power system. D.

WEST JORDAN, UTAH.—A franchise has been granted to H. S. Joseph to construct an electric railway between West Jordan and Bingham, to connect with the Salt Lake City & Utah Interurban Railway Company at West Jordan.

ARCO, IDAHO.—R. W. Ferris has been granted a franchise to install an electric light and power plant, to be completed May 1.

COEUR D'ALENE, IDAHO.—The City Council has under consideration the matter of submitting a bond issue for unicipal ownership of the water, light and telephone systems.

WENATCHEE, WASH.—The Wenatchee Valley Gas & Electric Company will construct a new 33,000-volt power line from the Dryden power plant to Wenatchee at an estimated cost of $20,000.

CATHLAMET, WASH. — James West and D. Ewart of Astoria, Ore., were here recently looking over the field with a view of installing an electric lighting system.

PORT TOWNSEND, WASH.—The City Council has taken definite steps toward acquiring the lighting and power plant owned and operated in this city by the Key City Light & Power Company. O.

RUSTON, WASH.—The Puget Sound Traction, Light & Power Company, Tacoma, Wash., division, has been granted a franchise by the City Council of Ruston to construct electric transmission lines and to sell light and power to Ruston. The extension will be made at an early date. O.

CLE ELUM, WASH.—Providing a favorable decision on rate reductions cannot be obtained from the Northwestern Improvement Company, which supplies this city with current for lighting, the council will take immediate steps, according to reports, toward the construction of a municipal lighting and power plant. O.

FOSSIL, ORE.—The Council has been petitioned by M. Ramey for a renewal of his lighting franchise and for permission to construct a crude oil-burning plant to cost between $4,000 and $5,000. O.

SUMPTER, ORE.—It is understood the Eastern Oregon Light & Power Company will construct transmission lines into the Olive Lake district, where a new pumping station and other improvements are being added. O.

LOS ANGELES, CAL.—The Board of Harbor Commissioners will receive bids up to January 19 for the electric installation for Warehouse No. 1, the work to be done in accordance with plans and specifications on file with the harbor engineer.

SAN PEDRO, CAL.—An application for a franchise to build a steam and electric railroad from some point on the Santa Fe main line to Oatman has been filed with the Mohave County Board of Supervisors.

LOS ANGELES, CAL.—The City Engineer has been directed to prepare specifications for additional lights in the Sherman Lighting District.

SAN BERNARDINO, CAL.—Property owners have signed an agreement to pay for the installation of boulevard lights on Fourth Street between D and E, and on E Street between Third and Fifth.

NEEDLES, CAL.—The Needles Gas & Electric Company has been granted a 50-year franchise to install and operate utility systems in this city.

FINANCIAL NOTES.

Baltimore financial districts learned that the Consolidated Gas, Electric Light & Power Company has arranged to issue quarterly statements of earnings, the first report to be issued in January showing the revenues of the corporation for the last quarter of the year ended in December. The fact that the company would make public its earnings quarterly was revealed through the application to list the common stock of the corporation on the New York Stock Exchange. Heretofore, the company has only issued annual reports covering operations ports covering operations for the fiscal for the fiscal year. The last annual report of the company made its appearance in October, which covered the company's business for the fiscal year ended June 30 last. It is understood that the earnings have shown steady increases each month since the new fiscal year was ushered in, and the report about to be issued will show what progress the company has made for the last three months as compared with the corresponding period of 1914.

Dividends.

	Term	Rate	Payable
Am. Lt. & Trac. com.	Q	2.5%	Feb. 1
Am. Lt. & Trac. com.	—	2.5%	Feb. 1
Am. Lt. & Trac. pf.	Q	1.5%	Feb. 1
Brooklyn City R. R.	Q	2 %	Jan. 15
Commonwealth Edison	Q	2 %	Feb. 1
Com. Pw., Ry. & Lt. pf.	Q	1.5%	Feb. 1
Com. Pw., Ry. & Lt. com.	Q	1 %	Feb. 1
Edison Co. of Boston	Q	3 %	Feb. 1
Puget Sound Trac., Lt. & Pw. pf.	Q	0.75%	Jan. 15
United Rys. & Elec., Balti. com.	Q	1 %	Jan. 15
Winnipeg Elec. Ry.	Q	2 %	———

Reports of Earnings.

DETROIT UNITED RAILWAY SYSTEM.

	1915	1914
November gross	$ 1,145,361	$ 994,244
Net earnings	315,312	265,761
Total income	344,990	288,741
Surplus after charges and taxation	154,228	106,466
Eleven months' gross	12,041,366	11,250,114
Net earnings	3,529,871	3,277,000
Total income	3,791,366	3,529,723
Surplus after charges and taxation	1,740,625	1,540,957

PACIFIC LIGHT & POWER CORPORATION.

	1915	1914
November gross	$ 250,389	$ 236,666
Net after taxes	164,638	153,104
Total income	175,344	160,462
Surplus after charges	67,802	48,178
Eleven months' gross	2,668,047	2,429,831
Net after taxes	1,776,883	1,482,656
Total income	1,889,749	1,635,692
Surplus after charges	707,485	483,227

COLUMBUS RAILWAY, POWER & LIGHT.

	1915	1914
November gross	$ 277,008	$ 261,656
Net after taxes	122,049	111,199
Surplus after charges	80,852	72,029
Twelve months' gross	3,091,422	3,063,753
Net after taxes	1,258,085	1,159,943
Surplus after charges	782,943	689,635
Balance after preferred dividends	497,820	404,512

NORTHERN OHIO TRACTION & LIGHT.

	1915	1914
November gross	$ 341,974	$ 286,732
Net after taxes	14,911	100,723
Surplus after charges	87,670	50,463
Balance after preferred dividends	70,761	35,358
Eleven months' gross	3,510,934	3,319,704
Net after taxes	1,355,889	1,279,691
Surplus after charges	780,620	723,336
Balance after preferred dividends	600,226	557,683

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Jan. 10	Jan. 3
American Tel. & Tel. (New York)	127⅞	*127¼
Commonwealth Edison (Chicago)	144	144
Edison Electric Illuminating (Boston)	247	246¾
Electric Storage Battery common (Philadelphia)	66½	66½
Electric Storage Battery preferred (Philadelphia)	66½	66½
General Electric (New York)	173⅞	174½
Kings County Electric (New York)	128	126
Massachusetts Electric common (Boston)	5½	5½
Massachusetts Electric preferred (Boston)	34	34
National Carbon common (Chicago)	165	165
National Carbon preferred (Chicago)	121	121
New England Telephone (Boston)	132	132
Philadelphia Electric (Philadelphia)	28⅝	28⅝
Postal Telegraph and Cables common (New York)	78½	78½
Postal Telegraph and Cables preferred (New York)	66¼	65½
Western Union (New York)	88⅛	87¾
Westinghouse common (New York)	68	*80
Westinghouse preferred (New York)	77	*69¾

*Ex-dividends.

PERSONAL MENTION.

MR. CHARLES L. BENJAMIN, secretary of Klaw-Van Pietersom-Dunlap, Inc., Milwaukee, Wis., formerly advertising manager of Cutler-Hammer Manufacturing Company, delivered a notable address on Monday evening, January 10, before the Chicago Trade Press Association. Mr. Benjamin spoke upon the subject of improving the service of business papers, and drew from his rich experience as editor, advertising manager and publicity counselor many splendid suggestions for increasing the value of the business journal to the reader and the advertiser. Earlier in the day Mr. Benjamin was the guest of the Advertising Association of Chicago at luncheon, when he made a brief address on the influence of the advertising club movement in the promotion of business.

MR. J. HARRY PIEPER, of the Southern California Edison Company, was presented with a gold watch, chain and knife on the recent occasion of his retirement as president of the Los Angeles Advertising Club. The presents, contributions for which were received from every member of the organization, were made in appreciation of his work during the past year, which has added largely to the success of the culb. Mr. Pieper is Reigning Comus, The Jovian Order, Los Angeles.

MR. F. H. GOLDING, for the past two years general manager of Atlantic City Electric Company, Atlantic City, N. J., and previous to that for a number of years general manager of the Rockford (Ill.) Electric Company has been appointed general manager of the Canton (O.) Electric Company, succeeding Mr. W. C. Anderson, late vice-president and general manager of that company.

OBITUARY.

MRS. JULIA M. BENNETT, mother of Ell C. Bennett, secretary of the Jovian Order, one of Missouri's foremost women journalists, died in St. Louis on December 26, 1915. Mrs. Bennett, who was 73 years old, was for six years a member of the St. Louis *Republic* staff, and later editor and proprietor of the Hannibal-Missouri *Courier*. Mrs. Bennett was born in Belleville, Ill., August 31, 1842. In addition to her editorial work she was a prolific contributor of both prose and poetry to the leading magazines of the country for nearly half a century. In addition to Ell C., who is well known in the electrical industry, she is survived by a daughter, Mrs. Fred H. Behring, and two others sons, Robert W. Bennett, of St. Louis, and A. R. Afflect, of Milwaukee. Mrs. Bennett was married twice, her first husband being Charles D. Afflect, a founder of St. Louis, who died many years ago. Mr. Bennett died in St. Louis several years ago.

MR. W. C. ANDERSON, manager of the Canton Electric Company, died at Canton, O., on December 23 after an illness of seven days. Mr. Anderson was born November 12, 1865, at Mill Creek, Pa. As a boy he started to work for the West Hoboken, N. J., Electric Company, and continued with that concern for 15 years before coming to Canton as manager of the Canton Heat, Light & Power Company, which later became the Canton Electric Company. He did much to build up the present Canton Electric Company, a subsidiary of the American Gas & Electric Company, a firm with which he had been connected

for fifteen years. During that time he had greatly enlarged the business of the concern, and in addition to building a new power plant and a new system for city distribution, Mr. Anderson took the first step in the move for the erection of a new power station along

W. C. Anderson.

the Ohio River to feed the Canton district.

He was second vice-president and a director of the Canton Chamber of Commerce. A few years ago he was president and before that vice-president of the Ohio Electric Light Association. He was a member of the Rotary Club, Canton Club, Lakeside Country Club, Elks, Y. M. C. A., and McKinley lodge, A. F. & A. M. Mr. Anderson was married 22 years ago, and is survived by his wife, one son and one daughter

MR. O. T. TROOIEN of Brookings, S. D., who died recently, at the age of 35, attracted considerable attention by his thesis on "Steam Engine Investigations," which was written at the University of Wisconsin and which is included in many mechanical engineering handbooks. The illness which caused his death was contracted while he was employed as an engineer in the construction of the Pennsylvania Hudson River terminals.

MR. C. J. WOLLASTON, known for his pioneer work in submarine telegraphy, died recently, aged 95 years.

DATES AHEAD.

Electrical Contractors' Association of Wisconsin. Annual convention, Hotel Wisconsin, Milwaukee, January 17-19. Secretary, Albert Petermann, 626 Lloyd Street, Milwaukee, Wis.

Minnesota Electrical Contractors' Association. Next meeting, St. Paul, Minn., January 20. Secretary, G. M. Jones, 14 Seventh Street North, Minneapolis, Minn.

Western Association of Electrical Inspectors. Eleventh annual meeting, Hotel Sherman, Chicago, January 25-27. Secretary, W. S. Boyd, 175 West Jackson Boulevard, Chicago, Ill.

Electrical Contractors' Association of the State of Illinois. Semi-annual convention, Hotel Sherman, Chicago, Ill., January 28 and 29. Secretaary, M. Blumenthal, 179 West Washington Street, Chicago, Ill.

American Electric Railway Association. Midyear meeting, Congress Hotel, Chicago, Ill., February 4. Secretary, E. R. Burritt, 8 West Fortieth Street, New York City.

American Institute of Electrical Engineers. Midwinter convention, New York City, February 8 and 9. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York City.

Illuminating Engineering Society. Midwinter convention, New York City, February 10 and 11. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York City.

New Mexico Electrical Association. Annual convention, Albuquerque, N. M., February 14-16. Secretary, E. A. Thiele, Roswell, N. M.

Electrical Supply Jobbers' Association. Quarterly meeting, Hotel Statler, Detroit, Mich., February 15-17. Secretary, F. Overbagh, 411 South Clinton Street, Chicago, Ill.

New England Section, National Electric Light Association. Question-Box convention, Boston, Mass., March 8 and 9. Secretary, Miss O. A. Bursiel, 149 Tremont Street, Boston, Mass.

Wisconsin Electrical Association. Annual convention, Hotel Pfister, Milwaukee, Wis., March 16 and 17. Secretary, George Allison, First National Bank Bldg., Milwaukee, Wis.

Record of Electrical Patents

Issued by the United States Patent Office, January 4, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,166,426. Electrical Testing Standard. C. B. Beck and J. M. Beck, Philadelphia, Pa. Resistance standard.

1,166,432. Conduit for Electric Wires. R. S. Case, Unionville, Conn. Flexible conduit.

1,166,441, 1,166,442 and 1,166,443. Electric Regulation. J. L. Creveling, assignor to Safety Car Heating & Lighting Co., Newark, N. J. First patent: Circuit regulator may be made inoperative without interfering with circuit. Second patent: Voltage and current regulation of axle-drivers, car-lighting generator. Third patent: In storage battery, axle-driven generator system.

1,166,464. Method of Maintaining the Efficiency of Metallic-Filament Lamps. A. J. Leibmann, assignor to N. Hofheimer, New York, N. Y. Manner of treating tungsten filaments.

1,166,466. Automatic Telephone System. A. E. Lundell, assignor to Western Electric Co., New York, N. Y. Semi-automatic system.

1,166,504. Typographical Composing Machine. H. M. Webster, Chicago, Ill. Electrically controlled machine for successively photographing characters on a sheet.

1,166,517. Distant Accounting Mechanism. M. M. Goldberg, assignor to National Cash Register Co., Dayton, O. Electro-magnetically controlled.

1,166,524. Process of Purifying Electrolytic Chlorin. U. Ishikawa, Tokyo, Japan. Process of removing hydrogen.

1,166,526. Electrically-Operated Saw. F. Kazlow, Schenectady, N. Y. Motor and saw suspended and laterally guided.

1,166,582. Wireless Apparatus for Producing and Transmitting Musical Sounds. G. Desilets, Nicolet, Quebec, Can. Controlling keys produce sparks of different frequencies.

1,166,596. Speed Indicating and Recording Apparatus of the Periodic Counter Type. F. G. L. Johnson, Chelsea, London, Eng. Electromagnetically controlled.

1,166,605. Automatic Electric Winding Clock. U. S. Kreider, Arcanum, O. Contact mechanism for closing winding circuit.

1,166,611. Magnetic Sun-Dial. J. H. L. Lund, Christiania, Norway. Glass cover of compass case has non-transparent line for throwing shadow.

1,166,617. Holder for Trolley-Poles. H. E. Mattox, Sherman, Cal. Structure on car roof.

1,166,618. Method of Making Perforated Music-Sheets. P. J. Meahl, Summit, N. J. Making of master copy for use in electrical duplicating machines.

1,166,620. Telephone Calling Mechanism and System. J. H. Melvin, assignor to Automatic Electric Co., Chicago, Ill. Rotary impulse transmitter.

1,166,624. Alarm Device for Valves. J. D. Nelson, Cincinnati, O. Alarm circuit controlled by position of valve through clock mechanism.

1,166,637. Collector for Electric Traction. R. C. Sayer, Redland, Eng. Two-conductor system.

1,166,645. Lock-Out Party-Line Telephone System. B. D. Willis, assignor to Automatic Electric Co. Arrangement of relays for locking out other subscribers when line is busy.

1,166,648. Electric Welding-Machine. C. M. Agnew, Milwaukee, Wis. Arrangement of work holders and automatic control of circuit by clamping lever.

1,166,650. Automatic Circuit-Breaker. C. C. Badeau, assignor to General Electric Co., Schenectady, N. Y. Laminated brush has stiff leaf acting as stop.

1,166,679. Safety Device for Conveyors. A. E. Handy, assignor to Otis Elevator Co., Jersey City, N. J. Electrically operated buffer device prevents running away of inclined, electrically driven, reversible conveyor.

1,166,682. Electromagnetic Separator. C. T. Henderson, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Arrangement of magnetic elements in separator pulley.

1,166,685. Automobile-Headlight. W. W. Holland and G. H. Snyder, Baltimore, Md. Arrangement of reflectors.

1,166, 699. Alternating Current Magnet. W. D. Lutz, assignor to Otis Elevator Co., Jersey City, N. J. Electromagnet immersed in oil with arrangement for having dash-pot effect on plunger.

1,166,704. Mechanism for Operating a Typewriter from a Calculating Machine. J. F. Mays, assignor to Mays Accounting Machine Co., Asheville, N. C. Electromagnetic operating connections formed by placing the machines side by side.

1,166,706. Electromagnet. T. W. Morgan, assignor to W. W. Marsh, Waterloo, Iowa. Core structure.

1,166,752. Ball-Joint for Lamp Supports and the Like. T. D. Finizio, assignor to Kurtz Electrical Co., New York, N. Y. For securing lamp socket to end of tubular support.

1,166,753. Bracket for Electric Lamps and the Like. T. D. Finizio, assignor to Kurtz Electrical Co. Comprises special arrangement of conductors and reel therefor.

1,166,765. Apparatus for Indicating at a Distance the Speed of Shafts or the Like. P. Kaminski, assignor to Siemens & Halske, A. G., Berlin, Germany. Synchronous motor element of indicator moves with armature of generator displaced, according to speed of shaft with which it is connected through magnetic coupling.

1,166,792. Evacuation Process. H. C. Snook, Cynwyd, Pa. Manner of exhausting bulbs, etc.

1,166,797. Photographic-Plate Holder for Use with X-Rays. G. W. White, Haverford, Pa. Details of holder structure.

1,166,815. Electric-Lamp Fixture. O. E. Cook, assignor to Cluett, Peabody & Co., Troy, N. Y. Combined lamp support and spool stand for sewing machine tables.

1,166,826. Rail-Joint Bond. H. Ethridge, Zelienople, Pa. Beneath rails with terminals embracing and brazed to bases.

1,166,852. Phonograph System for Revolving Auditorium. L. E. Myers, Chicago, Ill. Announcements by phonograph telephonically transmitted to series of cars on endless track.

1,166,871. Dry Battery-Cell. H. W. and H. Olaneta, Brooklyn, N. Y. Manner of assembling.

1,166,878. Lighting-Fixture. H. C. Adam, St. Louis, Mo. Manner of supporting bowl for indirect and semi-indirect lighting.

1,166,892. Apparatus for Producing High-Frequency Oscillations. R. A. Fessenden, assignor to S. M. Kintner, Pittsburgh, Pa., and H. M. Barrett, Bloomfield, N. J. One of spark-gap electrodes is disk moving at high frequency to prevent arcing.

1,166,893. Method for Producing High-Frequency Oscillations. R. A. Fessenden, assignor to S .M. Kintner, and H. M. Barrett. One of spark-gap electrodes rapidly moved, whereby discharge takes place on

continually cooled surface at every alteration of current.

1,166,898. Frog for Trolley Wires. C. E. Gierding, assignor to The Ohio Brass Co., Mansfield, Ohio. Details of cast structure.

1,166,908. Globe-Holder. E. K. Hill, assignor to A. & W. Electric Sign Co., Cleveland, O. Telescoped over incandescent bulb, is held by wire cage between bulb and globe.

1,166,912. Trolley-Wire Apparatus. W. H. Kempton, assignor to Ohio Brass Co., Mansfield, O. Details of trolley wire frog.

1,166,915. Railway Signaling. C. H. Lay, assignor to Union Switch & Signal Co., Swissvale, Pa. Block system having manually and automatically operated stop.

1,166,919. Electro-Traction-Control System. S. D. McCaleb, Louisville, Ky. Protects from head-on or rear-end collisions on single track electric road with turnouts.

1,166,923. Commutator Brush. G. S. Neeley, St. Louis, Mo., assignor of one-half to T. O. Moloney, St. Louis, Mo. Spring-pressed, pivoted brush roller on shaft bears against interior of commutator.

1,166,925. Apparatus for Recording and Reproducing Sound. F. S. Ober, New York, N. Y. For manipulating magnetized wire records.

1,166,928. Insulator-Supporting Bracket. C. L. Pierce, Jr., Pittsburgh, Pa. For attachment to pole.

1,166,930. Telescopic Combined Portable Flash-Light and Writing-Pad. J. A. Petrie, Westville, Conn. Telescopic cover for flash-light has transparent writing-plate.

1,166,948. Winding Machine. C. R. Underhill, assignor to Acme Wire Co., New Haven, Conn. Winding mandrel with regulation of speed and tension of strand.

1,166,950. Electrical Hot Water Apparatus. J. von Hantzel, New York, N. Y. Compact attachment for faucets; heats by passing current through water.

1,166,951. Resonating Relay. H. V. Kramer and G. Knapp, Edgbaston, Birmington, Eng. For operation by feeble alternating currents to establish local circuit.

1,166,974. Machine-Tool Control. A. L. DeLeeuw, assignor to Cincinnati Milling Machine Co., Oakley, Cincinnati, O. Electric control of milling machines, etc.

1,166,979. Stretching Device for Driving Chains from Magnetos or Lighting Dynamos in Internal Combustion Engine. H. Gallet, assignor to Etablissements De Dion-Bouton, Puteaux, France. Magneto supporting bracket adjustably pivoted to engine.

1,167,020. Magnetic Display Device. W. G. Reuter, Cincinnati, O. Mechanism on advertising device for moving magnet beneath table; follower on table traces magnet movement.

1,167,026. Electric Furnace. F. T. Snyder, Oak Park, Ill. Relates to water cooling and electrode-supporting crane in tilting furnace. (See cut.)

1,167,034. Advertising-Sign. A. E. Whitcomb, Rochester, N. Y. Opaque sign element with arrangement of lights, prism glasses, etc.

1,167,037. Socket-Shell. L. W. Andersen, Waterbury, Conn. Special structure of cap secured to shell by clamping ring.

1,167,038. Circuit Controller Switch and Casing Therefor. V. G. Apple, assignor to Apple Electric Co., Dayton, O. Concentric controller drums covered by hood and one of the drums has removable handle which disables locking means for hood and other controller.

1,167,039. Electric Conduit Fitting and Electrical Appliance. C. H. Bissell and D. C. Gidley, assignors to Crouse-Hinds Co., Syracuse, N. Y. Body receiving conduit ends has opening at side and resilient supporting arms into which socket may be snapped.

1,167,041 and 1,167,042. Insulator Support. R. C. Boozer, assignor to Joslyn Mfg. & Supply Co., Chicago, Ill. First patent: Threaded pin split axially and secured to channeled post. Second patent: Special form of pin supporting arm pole attachment.

1,167,045. Electrical Operating and Indicating Means. H. E. Cade and W. F. Cochrane, assignors to Pioneer Smoke Indicator Co., Wilmington, Del. For indicating density of smoke in stack.

1,167,053. Telephone System. A. H. Dyson, assignor to Western Electric Co., New York, N. Y. Automatic system; arrangement of selector relays, subscriber's interrupter, etc.

1,167,067. Electromagnetic Device. R. N. Hill, assignor to Western Electric Co. Details of electromagnet having pivoted armature moving in plane transverse to coil axes.

1,167,085. Automatic Door-Releasing Device. C. E. Lindig, New York, N. Y. Circuit of release controlled by spring motor set in operation by ringing call bell.

1,167,087. Magnetic Tracking Device. F. G. Lynde, assignor to Lauter Co., Newark, N. J. For player piano; magnet draws fingers controlling music sheet shift against sides of sheet.

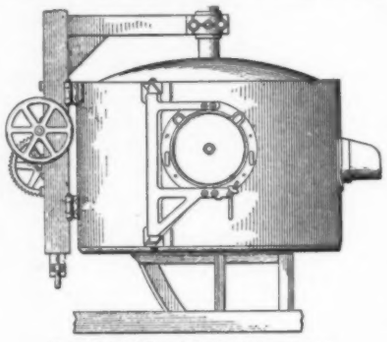
1,167,095. Electric Heater. J. B. Murray, Brooklyn, N. Y. Manner of supporting wire resistor in containing box.

1,167,115. Signal for Automobiles. H. Rose, Shreveport, La. Lamp carrying arm extensible from or retractible in a casing and controls circuit of audible signal.

1,167,119. Buffer Machine for Alternating Current Systems. A. Scherbius, assignor to General Electric Co. Fly wheel arrangement for equalizing load on system of distribution.

1,167,125. Method of Manufacturing Strain Insulators. T. Sloper, Devizes, Eng. Details of making from rubbered thread.

1,167,132. Attachment for Calculating Machines. M. Teetor, assignor to Teetor Co., Des Moines, Ia. Switch for driving electric motor operated by treadle through



No. 1,167,026.—Electric Furnace.

fluid cylinder connection which retards operation of switch on release of treadle.

1,167,138. Block System Switchboard. R. L. Turk, Minneapolis, Kans. Structure of connecting plugs, contact plate, etc.

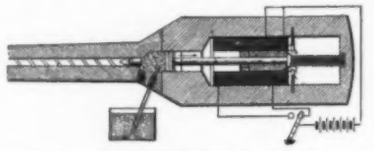
1,167,139. Engine for the Propulsion of Vessels. J. Williams, Canfield, Ohio. Particular arrangement of spark plug in special engine for direct connection to reciprocating propeller.

1,167,157. Maximum Indicator. C. G. Durfee, assignor to General Electric Co. Details of apparatus comprising non-return pointer actuated from rotating meter shaft.

1,167,158. Method of and Apparatus for Generating Power. W. L. R. Emmet, assignor to General Electric Co. Heat converted into electrical energy through medium of mercury vapor.

1,167,163. Coherer. C. F. Frank, assignor to General Electric Co. Special tube has magnetically controlled particles between electrodes.

1,167,176. Smelting of Ores and Apparatus Therefor. F. W. Highfield, Caversham, Eng. Furnace for reduction of



No. 1,167,178.—Electrohydraulic Gun.

complex sulfied ores has second class conductors molded on lining for heating charge.

1,167,178. Electrohydraulic Gun. R. C. Hill, Memphis, Tenn. Electromagnetically operated piston forces out projectile by hydraulic pressure. (See cut.)

1,167,185. Telephone-Protector. O. W. Kurth, Berlin, N. D. Combined heat coil and switch.

1,167,190. Bath Apparatus. W. Lippincott, Kalispell, Mont., assignor of one-half to J. K. Lang, Kalispell, Mont. Portable tank has cold-water compartment and electrically heated hot-water compartment.

1,167,208. Insulator. W. Oppelt, Metuchen, N. J., assignor of one-third to H. K. Gamber, Harrisburg, Pa. Two-part, pin type grips wire.

1,167,232. Attachment-Plug. S. Trood, assignor to Bryant Electric Co., Bridgeport, Conn. Details of swiveling plug.

1,167,247, System and Apparatus of Automatic Elevation and Lateral Direction of One or More Guns. F. Andersen, Haaogen, near Tonsber, Norway. Guns follow sighting telescope, being related through synchronous motors.

1,167,256. Vibrator. C. Bergman, Los Angeles, Cal. Details of massage instrument comprising electromagnetic vibrator.

1,167,266. Music-Lyre. F. A. Bua, Lodi, N. J. Lighting arrangement for music rack.

1,167,294. Railway Block-Signaling System. W. Grunow, New York, N. Y. Particular electromagnetic operating means for danger and permissive signals.

1,167,304. Automatic Lighting Attachment for Phonograph Cabinets. F. B. Johnson, Detroit, Mich. Special mounting of lamp having circuit controlled by cover.

1,167,308. Signaling Device. N. J. Mandelbaum, New York, N. Y. For automobiles; comprises adjustable signs in electric lighted casing.

1,167,309. Lubricated Bearing for Electric Fans. G. C. Marx, assignor to Diehl Mfg. Co., Elizabeth, N. J. For vertical shaft of ceiling fan.

1,167,310. Interrupter Mechanism for Ignition Dynamos. C. T. Mason, assignor to Splitdorf Electrical Co., Newark, N. J. Separate unit comprising condenser.

1,167,314. Automatic Photographing Apparatus. G. N. Pifer, assignor to Auto Portrait Co., Cleveland, O. Electrically operated.

1,167,318. Magnetic Latch. F. A. Schoenle, Buffalo, N. Y. Pivoted latch thrown into securing and released positions by two sets of electromagnets.

1,167,325. Combined Central-Energy Telephone and Watchman's Clock System. L. Airhart, West Reading, Pa., assignor of one-half to The Textile Machine Works, Wyomissing, Pa. Watchman's clock device thrown in operative relation to telephone operated signal relay by operation of signal cut-out switch.

1,167,329. Folding Machine. W. J. Beattie, assignor to Beattie Mfg. Co., Cohoes, N. Y. Folding devices electromagnetically operated.

1,167,344. Automatic Organ. M. C. Beman and F. A. Pilcher, assignors to Beman Symphonie Organ Co., Binghamton, N. Y. Stops electrically controlled by tracker bar.

1,167,366. Dynamo-Electric Machinery. R. A. Fessenden, assignor to Submarine Signal Co., Boston, Mass. Oscillating dynamo.

1,167,368. Head Support for Telephone Receivers. C. A. Randall, assignor to F. G. Davison, Boston, Mass. Receivers adjustable on head band.

1,167,370. Rail-Bond. J. Lindley, Providence, R. I., assignor of one-half to J. H. Lindley, Providence, R. I. Details of plate structure.

Reissue. 14,040. Metallic Cross-Arm. L. L. Crabtree and T. C. Ripley, Sulphur Springs, Texas. Original number 1,047,176. Dec. 17, 1912. Structural details of pin supporting arm.

Reissue. 14,041. Rear-End Signal for Vehicles. C. F. Marston, Cedarhurst, N. Y. Original No. 1,095,902. May 5, 1914. Electrically operated direction indicator controlled by switches associated with vehicle control foot pedal.

Patents Expired.

The following United States electrical patents expired on January 10, 1916:

617,314. Telephone. W. E. Byrns, Adams, Ind.

617,325. Railway Signal System. F. C. Esmond, New York, N. Y.

617,375. Electrical Resistance. J. F. H. Voight and J. A. Haeffner, Bockenheim, Germany.

617,381. Electric Transformer. D. H. Wilson, Chicago, Ill.

617,382. Telephone System. D. H. Wilson.

617,418. Electrical Measuring Instrument. G. T. Hanchett and F. B. Sage, Hackensack, N. Y.

617,433. Telephone. T. Berdell, Summit, N. J.

617,503. Circuit-Breaker. P. R. Goldey, Philadelphia, Pa.

617,526. Apparatus for Electrodeposition of Metals. E. Emerson, Buffalo, N. Y.

617,540. Electric Signal. C. A. Parrish, Jackson, Mich.

617,543. Electrotherapeutic and Massage Apparatus. O. Schneider, New York, N. Y.

617,546. Controlling Electric Motors and Trains. E. Thomson, Swampscott, Mass.

617,598. Automatic Regulator. G. S. Neeley, Pacific, Mo.

617,601. System of Control for Electric Motors and Railway Trains. W. B. Potter, Schenectady, N. Y.

617,608. Electrical Cutout. A. P. Seymour, Syracuse, N. Y.

617,621. Electric Headlight Lamp. H. P. Wellman, Ashland, Ky.

617,664. Automatic Alarm Mechanism for Electric Motors. R. W. Taylor, Richmond, Va.

617,691 and 617,692. Telephone Switchboard. J. M. Overshiner, Elwood, Ind.

617,702. Annunciator-Drop Device. W. O. Meissner, Chicago, Ill.